DELL®

Dell Precision™ WorkStation 210
Desktop Systems

USER'S GUIDE

Safety Instructions

Use the following safety guidelines to help protect your computer system from potential damage and to ensure your own personal safety.

When Using Your Computer System

As you use your computer system, observe the following safety guidelines.

WARNING: Do not operate your computer system with any cover(s) (including computer covers, bezels, filler brackets, front-panel inserts, and so on) removed.

- To help avoid damaging your computer, be sure the voltage selection switch on the power supply is set to match the AC power available at your location:

  — 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as Japan, South Korea, and Taiwan

  — 230 V/50 Hz in most of Europe, the Middle East, and the Far East

  Also be sure your monitor and attached peripherals are electrically rated to operate with the AC power available in your location.

- Before working inside the computer, unplug the system to help prevent electric shock or system board damage. Certain system board components continue to receive power any time the computer is connected to AC power.

- To help avoid possible damage to the system board, wait 10 to 20 seconds after disconnecting the system from AC power (until the standby light-emitting diode [LED] on the system board goes out) before removing a component from the system board or disconnecting a peripheral device from the computer.

- To help prevent electric shock, plug the computer and peripheral power cables into properly grounded power sources. These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a three-wire cable with properly grounded plugs.

- To help protect your computer system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).

- Be sure nothing rests on your computer system's cables and that the cables are not located where they can be stepped on or tripped over.

- Do not spill food or liquids on your computer. If the computer gets wet, consult your *Diagnostics and Troubleshooting Guide.*

- Do not push any objects into the openings of your computer. Doing so can cause fire or electric shock by shorting out interior components.

- Keep your computer away from radiators and heat sources. Also, do not block cooling vents. Avoid placing loose papers underneath your computer; do not place your computer in a closed-in wall unit or on a bed, sofa, or rug.
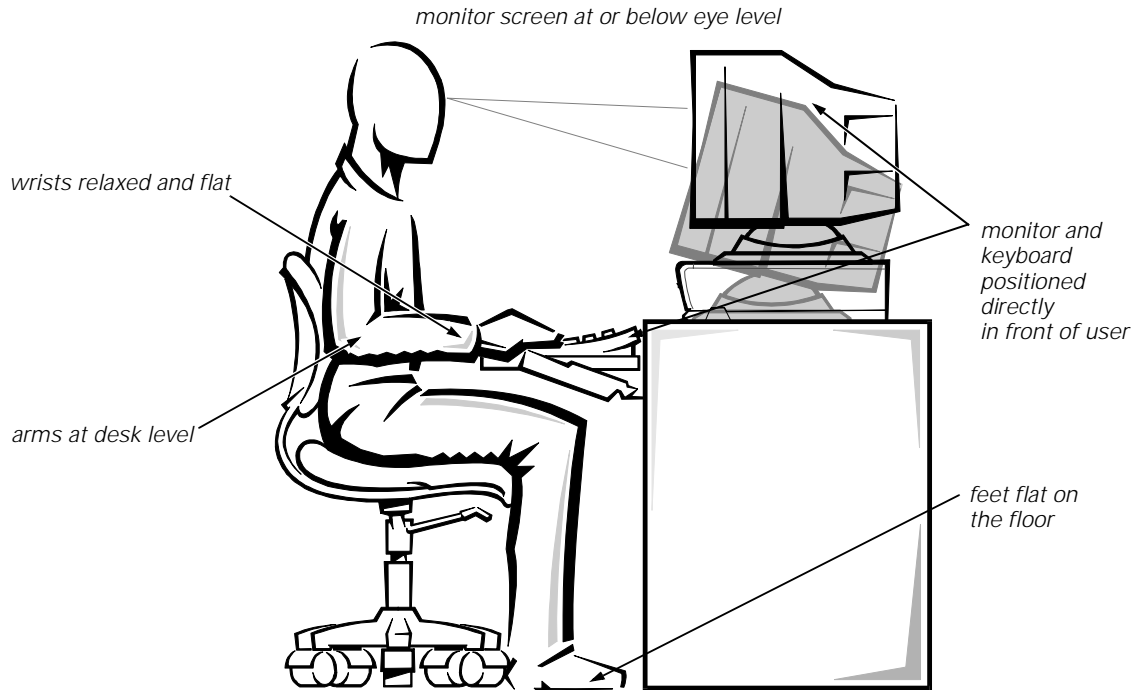
Ergonomic Computing Habits

WARNING: Improper or prolonged keyboard use may result in injury.

For comfort and efficiency, observe the following ergonomic guidelines when setting up and using your computer system:

- Position your system so that the monitor and keyboard are directly in front of you as you work. Special shelves are available (from Dell and other sources) to help you correctly position your keyboard.

- Set the monitor at a comfortable viewing distance (usually 510 to 610 millimeters [20 to 24 inches] from your eyes).

- Make sure the monitor screen is at eye level or slightly lower when you are sitting in front of the monitor.

- Adjust the tilt of the monitor, its contrast and brightness settings, and the lighting around you (such as overhead lights, desk lamps, and the curtains or blinds on nearby windows) to minimize reflections and glare on the monitor screen.

- Use a chair that provides good lower back support.

- Keep your forearms horizontal with your wrists in a neutral, comfortable position while using the keyboard or mouse.

- Always leave space to rest your hands while using the keyboard or mouse.

- Let your upper arms hang naturally at your sides.

- Sit erect, with your feet resting on the floor and your thighs level.

- When sitting, make sure the weight of your legs is on your feet and not on the front of your chair seat. Adjust your chair's height or use a footrest, if necessary, to maintain proper posture.

- Vary your work activities. Try to organize your work so that you do not have to type for extended periods of time. When you stop typing, try to do things that use both hands.

monitor screen at or below eye level

wrists relaxed and flat

monitor and
keyboard
positioned
directly
in front of user

arms at desk level

feet flat on
the floor

When Working Inside Your Computer

Before you remove the computer cover, perform the following steps in the sequence indicated.

⚠ **CAUTION: Do not attempt to service the computer system yourself, except as explained in this guide and elsewhere in Dell documentation. Always follow installation and service instructions closely.**

⚠ **CAUTION: To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.**

1. Touch an unpainted metal surface on the chassis, such as the metal around the card-slot openings at the back of the computer, before touching anything inside your computer.

    While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.

2. Turn off your computer and any peripherals.

3. Disconnect your computer and peripherals from their power sources. Also, disconnect any telephone or telecommunication lines from the computer.

   Doing so reduces the potential for personal injury or shock.

In addition, take note of these safety guidelines when appropriate:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure both connectors are correctly oriented and aligned.

- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

WARNING
There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.

- When transporting a sensitive component, first place it in an antistatic container or packaging.

- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

The following caution may appear throughout this document to remind you of these precautions:

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

x

Preface

About This Guide

This guide is intended for anyone who uses the Dell Precision 210 desktop computer systems. It can be used by both first-time and experienced computer users who want to learn about the features and operation of the systems or who want to upgrade their computers. The chapters and appendixes are summarized as follows:

- Everyone should read Chapter 1, "Introduction," for an overview of the system features and information on where to get help if you need it.

- Everyone should read the first few sections of Chapter 2, "Using the Software Support Utilities," to find out which utilities and drivers have been included with the system. Only users who want to use one of the utilities or drivers need to read the rest of Chapter 2.

- Everyone should read the first several sections of Chapter 3, "Using the System Setup Program," to familiarize themselves with this important program. Only users who want to make configuration changes to their system or who want to use the password features need to read the rest of Chapter 3.

- Users who add or remove an Industry-Standard Architecture (ISA) expansion card should read Chapter 4, "Using the ISA Configuration Utility."

- Users who want to connect their system to a network should read Chapter 5, "Using the Network Interface Controller." This chapter provides information on connecting the system to a network, configuring the optional network interface controller (NIC), and installing drivers for the NIC.

- Users who need information on the integrated sound features of the computer system should read Chapter 6, "Using the Integrated Audio Controller." Chapter 6 provides information on connecting audio equipment to your computer, installing audio drivers, and reconfiguring the integrated audio controller.

- Chapter 7, "Working Inside Your Computer," Chapter 8, "Installing System Board Options," and Chapter 9, "Installing Drives," are intended for users who want to install or remove options inside the computer, such as dual in-line memory modules (DIMMs), expansion cards, or drives.

- Appendix A, "Technical Specifications," and Appendix B, "Hardware Configuration Features," are intended primarily as reference material for users interested in learning more about the details of the system. Users who add internal options may need to refer to Appendix B to change jumper or switch settings.

- Appendix C, "ISA Configuration Utility Messages," describes error messages generated by the ISA Configuration Utility (ICU), possible causes, and corrective actions.

- Appendix D, "Maintaining the System," describes preventive maintenance procedures that you should perform regularly to keep your computer system in top operating condition.

- Appendix E, "Regulatory Notices," is for users who are interested in which regulatory agencies have tested and approved the Dell Precision WorkStation 410 desktop systems.

- Appendix F, "Warranties and Return Policy," describes the warranty for your Dell system and the "Total Satisfaction" Return Policy.

- The Glossary provides definitions of terms, acronyms, and abbreviations used in this guide.

Warranty and Return Policy Information

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. For information about the Dell warranty for your system, see Appendix F, "Warranties and Return Policy."

Other Documents You May Need

Besides this *User's Guide*, the following documentation is included with your system:

- The *Getting Started* sheet provides step-by-step instructions for setting up your computer system.

- The *Diagnostics and Troubleshooting Guide* includes troubleshooting procedures and instructions for using the Dell Diagnostics to test your computer system.

- Video card documentation from the card manufacturer describes the video card and video drivers included with the system. Refer to this documentation for information about configuring and optimizing your video subsystem.

You may also have one or more of the following documents.

*NOTE: Documentation updates are sometimes included with your system to describe changes to your system or software. Always read these updates **before** consulting any other documentation because the updates often contain the latest information.*

- Operating system documentation is included if you ordered your operating system software from Dell. This documentation describes how to install (if necessary), configure, and use your operating system software.

- Documentation is included with any options you purchase separately from your system. This documentation includes information that you need to configure and install these options in your Dell computer. Installation instructions for the options are included in this *User's Guide* or in the documentation that came with the options.

- Technical information files—sometimes called "readme" files—may be installed on your hard-disk drive to provide last-minute updates about technical changes to your system or advanced technical reference material intended for experienced users or technicians.

Notational Conventions

The following subsections describe notational conventions used in this document.

Warnings, Cautions, Notes

Throughout this guide, there may be blocks of text printed in bold type or in italic type. These blocks are warnings, cautions, and notes, and they are used as follows:

WARNING: A WARNING indicates the potential for bodily harm and tells you how to avoid the problem.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

NOTE: A NOTE indicates important information that helps you make better use of your computer system.

Typographical Conventions

The following list defines (where appropriate) and illustrates typographical conventions used as visual cues for specific elements of text throughout this document:

- *Interface components* are window titles, button and icon names, menu names and selections, and other options that appear on the monitor screen or display. They are presented in bold.

  Example: Click **OK**.

- *Keycaps* are labels that appear on the keys on a keyboard. They are enclosed in angle brackets.

  Example: <Enter>

- *Key combinations* are series of keys to be pressed simultaneously (unless otherwise indicated) to perform a single function.

  Example: <Ctrl><Alt><Enter>

- *Commands* presented in lowercase bold are for reference purposes only and are not intended to be typed when referenced.

  Example: "Use the **format** command to . . . ."

  In contrast, commands presented in the Courier New font are part of an instruction and intended to be typed.

  Example: "Type `format a:` to format the diskette in drive A."

- *Filenames* and *directory names* are presented in lowercase bold.

  Examples: **autoexec.bat** and **c:\windows**

- *Syntax lines* consist of a command and all its possible parameters. Commands are presented in lowercase bold; variable parameters (those for which you substitute a value) are presented in lowercase italics; constant parameters are presented in lowercase bold. The brackets indicate items that are optional.

  Example: **del** [*drive:*] [*path*] *filename* [**/p**]

- *Command lines* consist of a command and may include one or more of the command's possible parameters. Command lines are presented in the Courier New font.

  Example: `del c:\myfile.doc`

- *Screen text* is a message or text that you are instructed to type as part of a command (referred to as a *command line*). Screen text is presented in the Courier New font.

  Example: The following message appears on your screen:

  `No boot device available`

  Example: "Type `md c:\programs` and press `<Enter>`."

- *Variables* are placeholders for which you substitute a value. They are presented in italics.

  Example: DIMM_*x* (where *x* represents the DIMM socket designation).

Contents

Chapter 5   *Using the Network Interface Controller* *5-1*

Chapter 6   *Using the Integrated Audio Controller* *6-1*

Tables

C H A P T E R   1
Introduction

Dell Precision™ 210 systems are high-speed, upgradable workstations designed around Intel® Pentium® II microprocessors. These systems support the high-performance Peripheral Component Interconnect (PCI) bus and the accelerated graphics port (AGP) bus. Each system also has an Industry-Standard Architecture (ISA) design with one ISA slot that allows you to configure the computer system to your initial requirements and then upgrade it as necessary.

This chapter describes the major hardware and software features of the system and provides information you will need to reinstall the operating system, if necessary. It also provides information about the indicators and controls on the computer's front panel and discusses connecting external devices to the computer.

System Features

The system offers the following features:

- An Intel Pentium II microprocessor. The following microprocessor options are available:

  — Single or dual Intel Pentium II microprocessor(s) with an internal speed of 350 megahertz (MHz) and an external speed of 100 MHz

  — Single or dual Intel Pentium II microprocessor(s) with an internal speed of 400 MHz and an external speed of 100 MHz

  — Single or dual Intel Pentium II microprocessor(s) with an internal speed of 450 MHz and an external speed of 100 MHz

  The Intel Pentium II microprocessor includes MMX™ technology designed to handle complex multimedia and communications software. This microprocessor incorporates new instructions and data types as well as a technique called Single Instruction, Multiple Data (SIMD). SIMD allows the microprocessor to process multiple data elements in parallel, thereby improving system performance when you are running application programs written to take advantage of MMX technology.

  The Intel Pentium II microprocessor has a 16-kilobyte (KB) internal data cache and a 16-KB internal instruction cache, an internal math coprocessor, and other advanced internal logic.

DELL CONFIDENTIAL - Preliminary   8/17/98

- A secondary cache of 512 KB of static random-access memory (SRAM) integrated in the single-edge contact (SEC) cartridge. The secondary cache also provides error checking and correction (ECC) capability.

- Dual-processor capability. The system allows the installation of a second SEC cartridge (operating at the same frequency as the installed microprocessor), which can be purchased as a kit from Dell. Dual processing improves performance under operating systems that support multiprocessing, such as Microsoft® Windows NT® 4.0. Microsoft Windows® 95 and Microsoft Windows 98 do not support dual processing.

- A 16-bit, integrated Plug and Play Crystal CS4237B audio controller that is Sound Blaster Pro-compatible and that supports the Microsoft Windows Sound System. See Chapter 6, "Using the Integrated Audio Controller," for details.

- System memory that can be increased incrementally up to 512 megabytes (MB) using unbuffered synchronous dynamic random-access memory (SDRAM) dual in-line memory modules (DIMMs).

   The memory subsystem also provides ECC capability, which corrects all single-bit memory errors and detects all multibit errors. See "Adding Memory" in Chapter 8 for details on installing additional memory.

- Self-Monitoring Analysis and Reporting Technology (SMART) support, which warns you at system start-up if the hard-disk drive has become unreliable. To take advantage of this technology, you must have a SMART-compliant hard-disk drive in the computer. All enhanced integrated drive electronics (EIDE) hard-disk drives shipped with Dell Precision 210 systems are SMART-compliant.

- The system's basic input/output system (BIOS), which resides in flash memory and can be upgraded remotely or by diskette if required.

- Plug and Play capability, which greatly simplifies the installation of expansion cards. Plug and Play support included in the system BIOS allows you to install a Plug and Play expansion card without setting jumpers or switches or performing other configuration tasks. The ISA Configuration Utility (ICU) allows you to configure an existing ISA expansion card for conflict-free operation. Also, because the system BIOS is stored in flash memory, it can be updated to support future enhancements to the Plug and Play standard.

   NOTE: The Windows NT operating system does not provide ISA Plug and Play support. Therefore, some ISA Plug and Play cards (such as modem, sound, and network cards) may not work with your Windows NT operating system unless you configure them manually.

- Wakeup On LAN capability, which, when enabled in the System Setup program, allows the system to be started up from a server management console. Wakeup On LAN capability also allows remote computer setup, BIOS upgrades, software downloading and installation, file updates, and asset tracking after hours and on weekends when local area network (LAN) traffic is at a minimum.

- Universal Serial Bus (USB) capability, which simplifies connection of peripheral devices such as mice, printers, and computer speakers. The USB connectors on the computer's back panel provide a single connection point for multiple USB-compliant devices. USB-compliant devices can also be connected and disconnected while the system is running.

   CAUTION: Do not attach a USB device or a combination of USB devices that draw a maximum current over 500 milliamperes (mA) per channel or +5 volts (V). Attaching devices that exceed this threshold may cause the USB ports to shut down. See the documentation that accompanied the USB devices for their maximum current ratings.

- A modular computer chassis with a minimum number of screws for easy disassembly and improved serviceability.

- A high-speed, high-resolution AGP video card. (Documentation from the video card manufacturer is included with the system.) AGP greatly improves graphics performance by providing a dedicated bus for a faster interface between the video subsystem and system memory. AGP also allows conventional memory to be used for video-related tasks.

The system board includes the following integrated features:

- Three 32-bit PCI expansion slots, including one that is a shared PCI (32-bit)/ISA (16-bit) expansion slot.

- One AGP expansion slot.

- A diskette drive interface, which supports a 3.5-inch diskette drive.

- Two ATA-33 channels that support up to four EIDE devices. The primary and secondary channels utilize the PCI bus to provide faster data throughput. The primary channel supports up to two extremely high-capacity EIDE drives, the secondary channel supports up to two devices such as EIDE CD-ROM drives.

- Two high-performance serial ports and one bidirectional parallel port for connecting external devices.

- A Personal System/2 (PS/2)-style keyboard port and a PS/2-compatible mouse port.

- An integrated 10/100-megabit-per-second (Mbps) 3Com® PCI 3C905B-TX Ethernet network interface controller (NIC) with Wakeup On LAN support. The NIC is configured using software described in Chapter 5, "Using the Network Interface Controller."

The following software is included with your Dell computer system:

- Utilities that safeguard the system and enhance the operation of its hardware features; for example, the AutoShutdown service lets you perform an orderly shutdown with a single touch of the power button. For more information on these utilities, see Chapter 2, "Using the Software Support Utilities."

- Video drivers for the Microsoft Windows NT 4.0, Microsoft Windows 95, or Microsoft Windows 98 operating system.

   To change the resolution, check the documentation that came with your monitor to determine the resolutions and refresh rates supported by the monitor. Then

DELL CONFIDENTIAL - Preliminary   8/17/98

check the documentation that came with your AGP video card for instructions on changing the resolution.

- The System Setup program for quickly viewing and changing the system configuration information. For more information on this program, see Chapter 3, "Using the System Setup Program."

- Enhanced security features available through the System Setup program (a setup password, a system password, a system password lock option, a write-protect option for diskette drives, and automatic display of the system's service tag number). In addition, a customer-definable asset tag number can be assigned via a software support utility and viewed on the System Setup screens. A built-in chassis intrusion detector is also available. For more information, see Chapter 2, "Using the Software Support Utilities," and Chapter 3, "Using the System Setup Program."

- Advanced power management options that can reduce the energy consumption of the system. For more information, see Chapter 3, "Using the System Setup Program."

- The ICU, which allows you to configure ISA expansion cards manually. After resources have been assigned to these cards, the system BIOS can assign resources to PCI and Plug and Play expansion cards for a conflict-free configuration. For more information, see Chapter 4, "Using the ISA Configuration Utility."

- Dell Diagnostics for evaluating the computer's components and devices. For information on using the diagnostics, see the chapter titled "Running the Dell Diagnostics" in the *Diagnostics and Troubleshooting Guide.*

- Network device drivers for several network operating systems. These drivers are described in Chapter 5, "Using the Network Interface Controller."

- Desktop Management Interface (DMI) support for managing the computer system. DMI defines the software, interfaces, and data files that enable the system to determine and report information about system components.

  If the system has a Dell-installed Microsoft Windows or Microsoft Windows NT operating system, DMI is already installed on the system's hard-disk drive. To learn more about DMI, double-click the **Dell DMI Help** icon in the **Dell DMI** folder under the **Start** button.

- The Dell OpenManage™ program, which is a DMI browser that allows you to view your computer's current hardware configuration and operating system version. The Dell OpenManage provides information you may need if you call Dell for technical assistance or if you install hardware or software in your system. The Dell OpenManage program is located in the **Dell Accessories** folder. For more information on the Dell OpenManage program, see the next section, "Dell Open-Manage Program."

Dell OpenManage Program

The Dell OpenManage program is the Dell software-management application program interface for DMI. It allows you to manage system-level information, such as system

configuration information and management information format (MIF) database values (see Figure 1-1).
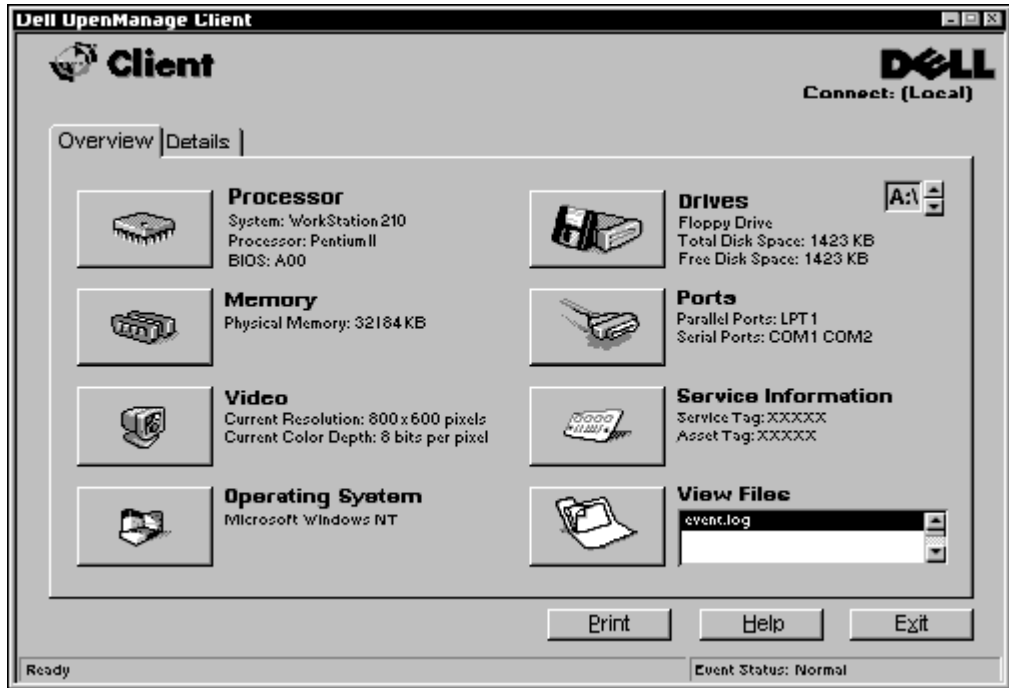
Figure 1-1. Dell OpenManage Program

On systems running Windows 95, WIndows 98, and Windows NT 4.0, the Dell Open-Manage program is available in client and administrator versions. The Dell OpenManage administrator version enables system administrators to view, manage, and inventory remote systems in a Dell DMI client network and incorporates the following manageability features, which are based on the DMI 2.0 specification.

Fault Management

Fault Management features of the Dell OpenManage include:

- Alerts to warn you about events generated by SMART drives on a local or remote system and about thermal errors

- An event log that stores events in a text file and reports information about the event under the following options: **System Name**, **Component Name**, **Date and Time**, **Event Type**, **Event Severity**, **Event Class**, and **Event System**

DELL CONFIDENTIAL - Preliminary   8/17/98

Configuration Management

Configuration Management features of the Dell OpenManage include:

- Wakeup On LAN support, which allows network administrators to remotely turn on Managed PC systems with Wakeup On LAN capability in a Dell DMI network.

- A **System Properties** window that enables network administrators to view, set, or disable certain hardware configuration settings for the local and remote systems in a Dell DMI network.

- Support for the Microsoft System Management Server (SMS), which allows the exporting of one or more groups to an SMS directory that the SMS administrator can access.

- A Monitor component for systems running Windows 95 and having a display data channel (DDC)-compliant video subsystem and monitor.

- Automated inventory control of one or more groups for the remote systems in a Dell DMI network. Network administrators can automate inventory to occur every day, week, or month at a certain hour, on the hour; or you can enable inventory as needed. The Dell OpenManage creates a text file for the group(s) and saves it to a user-defined directory.

- Support for the application program used to create user-definable attributes (UDAs).

Asset Management

Asset Management features of the Dell OpenManage include:

- Support that enables network administrators to remotely view, enter, and modify an asset tag for a remote system in a Dell DMI network

- Automated and manual mapping of one or more groups to a user-defined directory

Security Management

Security Management features of the Dell OpenManage include:

- Password security that enables network administrators to maintain standard attribute values for the local and remote systems in a Dell DMI network

For more information about the Dell OpenManage, refer to the online Dell Open-Manage Help that accompanied the software.

DELL CONFIDENTIAL - Preliminary   8/17/98

PXE

The preboot execution environment (PXE) allows a personal computer to be managed by one or more configuration management servers running the LANDesk® Configuration Manager (LCM) software, which provides management services for the many Managed PC systems on the network. The LCM allows network administrators to perform the following actions:

- Provide preboot support for a new Managed PC system that depends on the server for its initial operating system installation

- Service the network boot requests from the Managed PC systems

- Download diagnostics and BIOS update utilities

- Format the hard-disk drive, if required

- Download and install the operating system, based on previously established profiles

- Download and install applications software

- Update the operating system and applications as required

For additional information about the Intel LCM, refer to the documentation that accompanied the software.

Wakeup On LAN

The Wakeup On LAN feature allows you to remotely turn on a Managed PC system that is in a sleep state. The ability to turn on the Managed PC systems remotely allows you to perform remote computer setup, software downloading and installation, file updates, and asset tracking after hours and on weekends when users are not using the systems and network traffic is at a minimum.

To use the Wakeup On LAN feature, each Managed PC system must contain a NIC that supports Wakeup On LAN. You must also enable the Wakeup On LAN option in the System Setup program.

Auto Power On

Auto Power On enables you to turn on the computer system automatically on certain days of the week at a preset time. You can set Auto Power On to turn on the system either every day or every Monday through Friday.

NOTE: This feature does not work if the system is shut off using a power strip or surge protector.

DELL CONFIDENTIAL - Preliminary   8/17/98

Important Note to Windows 95, Windows 98, and Windows NT 4.0 Users

Your system was configured by Dell to optimize the features of your computer and of the Microsoft Windows NT 4.0, Windows 95, or Windows 98 operating system. If you need to reinstall either of these operating systems, there are several supplemental items that also must be installed to return the system to its full functionality. See the appropriate subsection that follows for your operating system.

Reinstalling Windows NT 4.0

To reinstall the Windows NT 4.0 operating system, you must have the following items:

- Windows NT 4.0 CD from Dell
- *Windows NT 4.0 Service Pack 3* CD
- Windows NT 4.0 bus-mastering EIDE driver diskette
- Windows NT 4.0 video driver diskettes
- Windows NT 4.0 NIC driver diskette
- Windows NT 4.0 audio driver diskette

*NOTE: You must create all the diskettes listed previously by using the Program Diskette Maker, which is located in the **Dell Accessories** folder.*

*NOTE: You **must** install Windows NT 4.0 Service Pack 3 and the bus-mastering EIDE driver **before** installing the NIC drivers. Otherwise, the integrated NIC will not function properly.*

See the *Dell-Installed Microsoft Windows NT Workstation 4.0 Setup Guide* for general installation information for Windows NT 4.0 and for information about other drivers or supplements that may be required. For installation instructions for the various drivers, see the appropriate section or document as follows:

- Windows NT 4.0 bus-mastering EIDE driver — See "Bus-Mastering EIDE Drivers" in Chapter 2.
- Windows NT 4.0 video drivers — See the documentation for your video card.
- Windows NT 4.0 NIC driver — See "Windows NT 4.0 NIC Driver" in Chapter 5.
- Windows NT 4.0 audio drivers — See "Audio Drivers for Windows NT 4.0" in Chapter 6.

Reinstalling Windows 95 or Windows 98

To reinstall the Windows 95 or Windows 98 operating systems, you must have the following items:

- Windows 95 or Windows 98 CD from Dell
- Windows 95 or Windows 98 PIIX4 diskette

DELL CONFIDENTIAL - Preliminary   8/17/98

- Windows 95 or Windows 98 video driver diskettes
- Windows 95 or Windows 98 NIC driver diskette
- Windows 95 or Windows 98 audio driver diskette
- Windows 95 or Windows 98 USB supplement diskette

*NOTE: You must create all the diskettes listed previously by using the Program Diskette Maker, which is located in the **Dell Accessories** folder.*

See the *Dell-Installed Microsoft Windows 95 Setup Guide* or *Dell-Installed Windows 98 Setup Guide* for general installation information for Windows 95 or Windows 98 and for information about other drivers or supplements that may be required. For installation instructions for the various drivers, see the appropriate document or section as follows:

- Windows 95 or Windows 98 PIIX4 — See "Intel PIIX4 INF Update Installer for Windows 95 or Windows 98" found later in this chapter.
- Windows 95 or Windows 98 video drivers — See the documentation for your video card.
- Windows 95 or Windows 98 NIC driver — See "Windows or Windows 98 NIC Driver" in Chapter 5.
- Windows 95 or Windows 98 audio drivers — See "Audio Drivers for Windows 95 or Windows 98" in Chapter 6.
- Windows 95 or Windows 98 USB driver — See the *Dell-Installed Microsoft Windows 95 Setup Guide* or *Dell-Installed Microsoft Windows 98 Setup Guide*.

NOTES: If you reinstall Windows 95 or Windows 98 from the Windows 95 or Windows 98 CD, the bus-mastering functionality of the Windows 95 or Windows 98 EIDE driver, which was operative in your original configuration, will be disabled. (The system will operate without the bus-mastering functionality with only a small degradation in performance. For information on the advantages of using bus-mastering drivers, see "Enabling the Windows 95 or Windows 98 Bus-Mastering EIDE Driver" in Chapter 2.)

If you are an administrator of corporate networks and you must download the Windows 95 or Windows 98 operating system from a server to client systems, make sure that you have the Windows 95 or Windows 98 backup media for the Precision 210 system on your server before downloading.

Intel PIIX4 INF Update Installer for Windows 95 or Windows 98

NOTE: The following procedure applies only to versions of the Microsoft Windows 95 or Windows 98 operating system installed by Dell.

If you must reinstall Windows 95 or Windows 98 on the computer system, you also need to run the Intel PIIX4 INF Update Installer for Windows 95 or Windows 98 immediately after installing the operating system. Doing so enables Windows 95 or Windows 98 to detect and configure PCI devices controlled by the integrated 82371EB component.

DELL CONFIDENTIAL - Preliminary   8/17/98

Before you can perform the update, you must make a diskette copy of the update software from the disk image on the hard-disk drive. To make the diskette copy, use the Program Diskette Maker, which is located in the **Dell Accessories** folder.

To install the update, follow these steps:

1. Insert the *Windows 95 Intel Support Driver Ver. A00* or *Windows 98 Intel Support Driver Ver. A00* diskette into drive A.

2. Click the **Start** button and click **Run**.

3. Type a:\setup.exe and click OK.

4. Click **Next** on the **Welcome Screen**.

    The license agreement opens in the Notepad application program.

5. View the text file and close the Notepad application program when you are ready to proceed.

6. Click **Yes** to continue.

    A dialog box lists the information (**.inf**) files on the system that will be revised by the update software.

7. Click **Next** to continue.

8. Click **OK** to start the installation.

9. When the installation is complete, remove the diskette from the diskette drive and click **OK** to restart the system.

    During start-up, the operating system detects new hardware and the **Update Device Driver Wizard** screen appears.

10. Click **Next** to continue.

    The system finds the hardware device driver on the hard-disk drive and installs it.

11. Click **Finish**.

    The system continues its start-up routine. When Windows 95 or Windows 98 finishes loading, a dialog box informs you that the system configuration settings have changed and asks if you want to restart the system.

12. Click **OK** to restart the system.

DELL CONFIDENTIAL - Preliminary   8/17/98

Front Panel

The computer's front panel contains the following indicators and controls (see Figure 1-2):

- The *power button* provides control of the system's AC input power. The push-button switch operates as follows:

    — When the computer is turned off, pressing the button turns the computer on.

    — When the computer is turned on, pressing the button turns the computer off. However, a low-voltage (standby) current is maintained by the power supply. To completely remove all power from the system, unplug the AC power cable from its source.

    For systems running Microsoft Windows 95, Windows 98, or Windows NT with the Dell AutoShutdown service operational, pressing the power button causes the system to perform an orderly operating system shutdown before turning off. (For more information, see "Dell AutoShutdown Service" in Chapter 2.)

    NOTE: A Display Power Management Signaling (DPMS) monitor does not begin warming up until the computer to which it is attached is turned on. Thus, some DPMS monitors may not display a video image until several seconds after you turn on the computer.

- The *power indicator* light is green during normal system operation and amber when the computer is in sleep mode.

- The *hard-disk drive access indicator* lights up when a hard-disk drive is in use.

- The *diskette-drive access indicator* lights up when the diskette drive is in use.

- The *reset button* reboots (restarts) the system without your having to turn the power off and then on again. Rebooting the system in this manner reduces stress on system components.

Figure 1-2. Front Panel

DELL CONFIDENTIAL - Preliminary   8/17/98
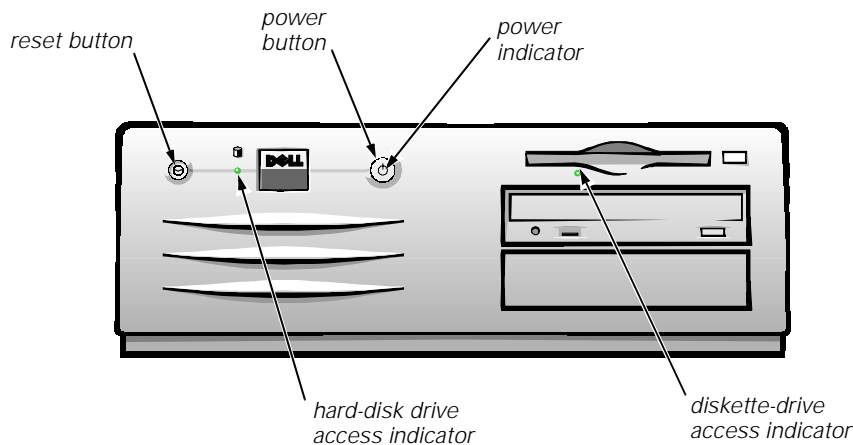
Back Panel

The computer's back panel contains various ports and connectors for attaching external devices and includes a security cable slot. These features are described in the following subsections.

For information about enabling, disabling, or configuring input/output (I/O) ports and connectors, see Chapter 3, "Using the System Setup Program." For detailed descriptions and illustrations of each port and connector on the back panel, see "I/O Ports and Connectors" in Appendix B.

Connecting External Devices

You can connect various external devices, such as a mouse and printer, to the I/O ports and connectors on the computer's back panel. The system BIOS detects the presence of most external devices when you boot or reboot the system. When connecting external devices to the computer, follow these guidelines:

- Check the documentation that accompanied the device for specific installation and configuration instructions.

  For example, most devices must be connected to a particular I/O port or connector to operate properly. Also, external devices like a mouse or printer usually require you to load software files called *device drivers* into system memory before they will work. These software drivers help the computer recognize the external device and direct its operation.

- Dell recommends that you attach external devices *only while the computer is turned off* unless you are instructed otherwise in the documentation for the particular device. Then turn the computer on before turning on any external devices unless the documentation for the device specifies otherwise. (If the computer does not seem to recognize the device, try turning on the device before turning on the computer.)

CAUTION: When disconnecting external devices from the back of the computer, wait 10 to 20 seconds after disconnecting the computer from AC power before you disconnect the device to avoid possible damage to the system board.

Security Cable Slot and Padlock Ring

On the back of the computer are a security cable slot and padlock ring (see Figure 1-3) for attaching commercially available antitheft devices. Security cables for personal computers usually include a segment of galvanized cable with an attached locking device and key. To prevent unauthorized removal of the computer, loop the cable around an immovable object, insert the locking device into the security cable slot on the back of the computer, and lock the device with the key provided. Complete instructions for installing this kind of antitheft device are usually included with the device.

NOTE: Antitheft devices are of differing designs. Before purchasing such a device, make sure it will work with the cable slot on the computer.

DELL CONFIDENTIAL - Preliminary   8/17/98

The padlock ring allows you to secure the computer cover to the chassis to prevent unauthorized access to the inside of the computer. To use the padlock ring, insert a commercially available padlock through the ring and then lock the padlock.

security cable slot

padlock ring

fan vent
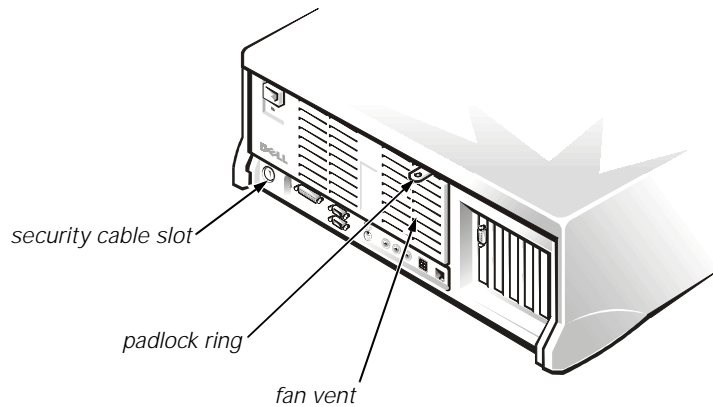
Figure 1-3. Security Cable Slot and Padlock Ring

Getting Help

If at any time you don't understand a procedure described in this guide or if the system does not perform as expected, Dell provides a number of tools to help you. For more information on these help tools, see the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide.*

DELL CONFIDENTIAL - Preliminary   8/17/98

C H A P T E R 2
Using the Software Support Utilities

Your Dell system comes with software support utilities on diskette or on your computer's hard-disk drive. These software support utilities include system utilities, system services, and bus-mastering enhanced integrated drive electronics (EIDE) drivers, all of which are documented in this chapter.

For information on the additional software support utilities you received with your system, refer to the following chapters or documents:

- Video drivers — See the documentation from the video card manufacturer. (Video drivers support the video graphics requirements of a variety of monitors and application programs running under the Microsoft Windows NT 4.0, Microsoft Windows 95, or Windows 98 operating system.)

- Audio drivers — See Chapter 6, "Using the Integrated Audio Controller."

- Network interface drivers — See Chapter 5, "Using the Network Interface Controller."

System utilities and services can be used to safeguard your system and to explicitly control certain hardware features. Refer to "System Utilities and Services" found later in this chapter for information about these utilities.

Bus-mastering EIDE drivers are included in the Windows 95 or Windows 98 operating systems. These drivers can off-load certain functions from the system microprocessor, providing a performance improvement during multithreaded operations. Refer to "Bus-Mastering EIDE Drivers" found later in this chapter for information about these drivers.

Microsoft updated Advanced Technology Attachment Packet Interface (ATAPI) drivers are provided with your Dell system for the Windows NT 4.0 operating system. Refer to "Microsoft Updated ATAPI Drivers" found later in this chapter for information about these drivers.

Dell-Installed Software Support Utilities

The system utilities, services, and bus-mastering EIDE drivers are already installed on your hard-disk drive in two different forms: as working utilities, operative immediately, and as diskette images.

In case you later need to reinstall the files for any reason, you need to copy the diskette images to a backup diskette (see the next section, "Backing Up the Software Support Utilities"). From the backup diskette, you can install the desired file(s) to a directory on your hard-disk drive. Further instructions for installing the utilities, services, and drivers are provided later in this chapter.

Backing Up the Software Support Utilities

Dell recommends that you create original diskette copies, or *program diskette sets*, of your Dell-installed software. You will need these diskettes if you ever want to reconfigure or reinstall your Dell-installed software. To create program diskettes, use the Program Diskette Maker (available through the **Dell Accessories** program folder).

Software Support Utilities on Diskette

If you received Dell software support diskettes, the Dell system utilities, services, and bus-mastering EIDE drivers are provided on these diskettes. To use a utility, service, or bus-mastering EIDE driver, you must install the utility, service, or driver as described later in this chapter.

NOTE: On each software support diskette set you receive, a **release.txt** *file may be included (on diskette 1 of the set). If included, the* **release.txt** *file contains the latest updates to the information in this guide. Use the editor included with your operating system to view and/or print the contents of the* **release.txt** *file.*

System Utilities and Services

The following utilities and services are included on your Dell system utilities diskette**:**

- The *Asset Tag* utility lets you enter a system asset tag number and an owner tag into nonvolatile random-access memory (NVRAM). Thereafter, you can display this number using the Asset Tag utility or the System Setup program.

- The *Dell AutoShutdown* service provides Windows 95, Windows 98, and Windows NT 4.0 the ability to perform an orderly system shutdown when the power button is pressed.

- The *Dell ThermalShutdown* service provides Windows 95, Windows 98, and Windows NT 4.0 the ability to perform an orderly system shutdown in the event of a thermal failure. This feature prevents permanent damage to your system caused by a component overheating.

- The *Auto Power On* utility (which runs under the MS-DOS® operating system only) reports what caused the system to power on, such as the power switch or a call from the Auto Power On utility itself. This utility also enables you to create a batch file to carry out a series of commands when your system is powered on by the Auto Power On feature or by the power switch.

Reinstalling the Dell System Utilities and Services for Windows 95 or Windows 98

The system utilities and services are already installed and operative on your hard-disk drive. If, for any reason, you need to reinstall the utilities and services, perform the following steps:

1. If you have not already done so, use the Program Diskette Maker to make a diskette copy of the Dell system utilities diskette image on your hard-disk drive.

   The Program Diskette Maker is available through the **Dell Accessories** folder. For more information, refer to the online help provided in the Program Diskette Maker.

2. Start Windows 95 or Windows 98. If you are already running Windows 95 or Windows 98, close any open documents or application programs.

3. With the backup diskette in drive A, run the **setup.exe** program from the diskette.

4. Follow the on-screen instructions to install the Dell utilities and services.

   The Asset Tag utility and Auto Power On utility (if installed) are located in the **c:\dellutil** directory.

Reinstalling the Dell System Utilities and Services for Windows NT 4.0

The system utilities and services are already installed and operative on your hard-disk drive. If, for any reason, you need to reinstall the utilities and services, perform the following steps:

1. If you have not already done so, use the Program Diskette Maker to make a diskette copy of the Dell system utilities diskette image on your hard-disk drive.

   The Program Diskette Maker is available through the **Dell Accessories** folder. For more information, refer to the online help provided in the Program Diskette Maker.

2. Start Windows NT and log in as Administrator or as a user with administrative privileges. If you are already running Windows NT, close any open documents or application programs.

3. With the backup diskette in drive A, run the **setup.exe** program from the diskette.

4. Follow the on-screen instructions to install the Dell utilities and/or services. When the installation is finished, restart your system to activate the services.

DELL CONFIDENTIAL - Preliminary   8/17/98

5. Verify that the utilities and/or service(s) are installed and running.

   Double-click the **Services** icon in the **Control Panel**. **AutoShutdown** and **ThermalShutdown** should be listed with the status of Started.

   The Asset Tag utility and Auto Power On utility (if installed) are located in the **c:\dellutil** directory.

Removing a Service

To remove a service, perform the following steps:

1. Insert the backup diskette in drive A.

2. Run **remove.exe** from the diskette.

3. Select the service(s) you want to remove and click **Next**.

Asset Tag Utility

The Asset Tag utility allows you to enter an asset tag number for the computer. The default System Setup screens (see Figure 3-1) do not show the asset tag number unless you enter one using this utility.

NOTE: The Asset Tag utility does not function correctly under Windows NT or Windows 95. However, you may be able to run the utility in Windows NT by booting from a DOS diskette or diagnostics diskette, exiting to the DOS prompt, and then entering the **asset** *command on the DOS command line.*

You can use the Asset Tag utility to enter an asset tag number that you or your company assign to the computer.

You can also use the Asset Tag utility to enter an owner tag that appears in the system sign-on screen.

Use the **asset** command from an MS-DOS prompt. To view existing asset tag and service tag numbers, type asset and press <Enter>. (You can also view the asset tag number using the System Setup program described in Chapter 3.)

The Asset Tag utility is located in the **c:\dellutil** directory.

DELL CONFIDENTIAL - Preliminary   8/17/98

Assigning and Deleting an Asset Tag Number

An asset tag number can have up to ten characters; any combination of characters excluding spaces is valid. To assign or change an asset tag number, type `asset` and a space followed by the new number; then press <Enter>. For example, type the following command line and press <Enter>:

`asset 1234$ABCD&`

When prompted to verify the asset tag number, type `y` and press <Enter>. The system then displays the new or modified asset tag number and the service tag number.

To delete the asset tag number without assigning a new one, type `asset /d` and press <Enter>.

Assigning and Deleting an Owner Tag

An owner tag can be up to 80 characters; any combination of letters, numbers and spaces is valid. To assign an owner tag, type `asset /o` and a space followed by the new owner tag; then press <Enter>. For example, type the following command line and press <Enter>:

`asset /o ABC Company`

When prompted to verify the owner tag, type `y` and press <Enter>. The system then displays the new owner tag.

To delete the owner tag without assigning a new one, type `asset /o /d` and press <Enter>.

Table 2-1 lists the command line options you can use with the Asset Tag utility. To use one of these options, type `asset` and a space followed by the option.

Table 2-1. Asset Tag Command-Line Options

Asset Tag Option	Description
/d	Deletes the asset tag number
/o <*tag*>	Specifies a new owner tag
/o /d	Deletes the owner tag
/?	Displays the Asset Tag utility help screen

Dell AutoShutdown Service

The Dell AutoShutdown service provides the Microsoft Windows 95, Windows 98, and Windows NT 4.0 operating systems the ability to perform an orderly system shutdown when the power button is pressed.

How the AutoShutdown Service Works

The power switch operates in two modes: immediate and AutoShutdown. When the system is off, the power switch always acts in immediate mode—that is, when the switch is pressed, the system turns on immediately.

When the system is on and the AutoShutdown service is installed, the power switch operates in AutoShutdown mode. Pressing the power switch signals the operating system to perform an orderly shutdown (reducing the possibility of data loss and file corruption) before removing power from the system. During the shutdown sequence, the power indicator on the computer blinks.

If Your Operating System Locks Up

If the power indicator blinks when you press the power switch, but the system does not turn off, your operating system may have locked up. To turn off the system in this situation, either press the power switch a second time or press the reset button.

NOTE: This scenario (a locked-up system with the AutoShutdown service active) is the only situation in which pressing the reset button turns off the system without rebooting it.

Dell ThermalShutdown Service

The Dell ThermalShutdown service helps protect components such as the system processor and the primary hard-disk drive from damage due to overheating. It can also protect your system data from loss or corruption resulting from a thermal-related system shutdown.

When installed, the service uses sensors to monitor the temperature of critical internal components. If a sensor detects a thermal event, the system first performs an orderly operating system shutdown and then turns itself off. During the shutdown phase, the power indicator flashes and a screen message notifies the user that the system is shutting down.

If the ThermalShutdown service is unable to shut down the system, the system will be shut down if Thermal Power-off is enabled in the System Setup program. (See "Thermal Power-Off" in Chapter 3 for more information.)

CAUTION: The thermal sensors are always installed and operational. If the ThermalShutdown service is *not* installed and a thermal event occurs, the system turns off after approximately 3 minutes if Thermal Power-off is enabled in the System Setup program.

DELL CONFIDENTIAL - Preliminary   8/17/98

Auto Power On Utility

The Auto Power On utility (available for MS-DOS only) enables your system to auto-matically perform routine tasks in your absence. For example, you might want your system to turn on at night and perform a backup procedure. To use the utility, you need to create a batch file containing the command(s) or program(s) that you want performed in your absence. The Auto Power On utility determines whether system power was turned on by the power button or by the Auto Power On setting in the System Setup program and passes this information on to your batch file, which initiates the appropriate commands at system start-up. See "Auto Power On" in Chapter 3 for information on setting Auto Power On in the System Setup program.

The following example shows the contents of a possible batch file.

NOTE: The first three lines of your batch file **must** *match the first three lines in the follow-ing example.*

```
autopowr
if errorlevel 2 goto alarm
if errorlevel 1 goto button

:alarm
call alarm.bat
autopowr /off

:button
call button.bat
goto end
```

The **autopowr /off** command turns off your computer.

Installing the Auto Power On Utility

The Auto Power On utility is already installed on your hard-disk drive. If you need to reinstall the Auto Power On utility, perform the following steps:

1. If you have not already done so, use the Program Diskette Maker to make a dis-kette copy of the Dell System Utilities diskette image on your hard-disk drive.

   The Program Diskette Maker is available through the Dell Accessories program folder. For more information, refer to the online help provided in the Program Dis-kette Maker.

2. With the backup diskette in drive A, copy **autopowr.com** from the diskette to a directory of your choice on your hard-disk drive.

If the **path** statement in your **autoexec.bat** file does not already contain the directory in which you reinstalled the Auto Power On utility, modify the **path** statement to include that directory. (See your MS-DOS reference documentation for information on modifying the **autoexec.bat** file.)

Bus-Mastering EIDE Drivers

Bus-mastering EIDE drivers (provided for Windows 95 or Windows 98 operating systems) offer a performance improvement by off-loading certain functions from the system microprocessor during multithreaded operations. The bus-mastering driver for your operating system has been installed by Dell and is operative when you receive your computer. No further installation or configuration is needed.

A backup copy of the Windows 95 or Windows 98 driver is provided with the Windows 95 or Windows 98 CD. This driver will be reinstalled automatically if you reinstall Windows 95 or Windows 98. However, the driver is disabled until you complete the steps provided in "Enabling the Windows 95 or Windows 98 Bus-Mastering EIDE Driver" found later in this chapter.

Enabling the Windows 95 or Windows 98 Bus-Mastering EIDE Driver

NOTE: Bus-mastering EIDE support is provided only in Windows 95 versions 4.00.950 B and later and Windows 98.

If you have disabled the Windows 95 or Windows 98 bus-mastering EIDE driver and want to reenable it, or if you have reinstalled Windows 95 or Windows 98 from CD and want to enable the bus-mastering EIDE driver, perform the following steps:

1. Start the Windows 95 or Windows 98 operating system.

2. Double-click **My Computer**.

3. Double-click **Control Panel**.

4. Double-click the **System** icon.

5. Click the **Device Manager** tab.

6. Double-click the **Disk Drives** icon.

7. Double-click the icon for EIDE (or IDE) drives.

8. Click the **Settings** tab.

9. Click the **DMA** check box and click **OK**.

Microsoft Updated ATAPI Drivers

Microsoft updated ATAPI drivers (provided for the Windows NT 4.0 operating system) offer a performance improvement by off-loading certain functions from the system processor during multithreaded operations. Dell has installed the Microsoft updated ATAPI driver for your operating system, and it is operative when you receive your computer. No further installation or configuration is needed.

NOTE: If Windows NT 4.0 is reinstalled, the Microsoft updated ATAPI drivers must also be reinstalled.

DELL CONFIDENTIAL - Preliminary   8/17/98

The driver for Windows NT 4.0 has also been copied to your hard-disk drive in diskette-image form. If you need to reinstall or remove this driver, you can do so as described in the following subsections.

Reinstalling the Windows NT 4.0 Microsoft Updated ATAPI Driver

NOTE: To install the Microsoft updated ATAPI driver for Windows NT 4.0, you must have a mouse connected to the system and Windows NT 4.0 must already be installed on the hard-disk drive connected to the primary EIDE channel.

To reinstall the Microsoft updated ATAPI driver for Windows NT 4.0, perform the following steps:

1. If you have not already done so, use the Program Diskette Maker to make a diskette copy of the Dell Microsoft updated ATAPI driver diskette image on your hard-disk drive.

    The Program Diskette Maker is available through the **Dell Accessories** program folder. For more information, refer to the online help provided in the Program Diskette Maker.

2. Start the Windows NT operating system. If you are already running Windows NT, close any open documents or application programs.

3. Insert the Microsoft updated ATAPI driver diskette in drive A.

4. Click the **Start** button.

5. Click **Run**, type `a:\setup.bat` in the **Run** window, and then click **OK**.

    A black screen will quickly appear and disappear, which indicates that the driver file has been loaded. Setup automatically saves the existing **atapi.sys** driver as **atapi.000** and loads the new driver into the **system32\drivers** subdirectory in the Windows NT directory.

6. Remove the diskette from drive A. Then restart the computer.

*NOTE: To enable or disable direct memory access (DMA) while using the Microsoft updated ATAPI driver, run **dmacheck.exe** from **\support\utils\i386** on the* Microsoft Windows NT Service Pack 3 *CD.*

Removing the Windows NT 4.0 Microsoft Updated ATAPI Driver

To remove the Microsoft updated ATAPI driver, follow these steps:

1. Start the Windows NT operating system. If you are already running Windows NT, close any open documents or application programs.

2. Use Explorer to open the **system32\drivers** subdirectory in the Windows NT directory.

DELL CONFIDENTIAL - Preliminary   8/17/98

3. Rename the existing **atapi.sys** file to **atapi.bak**.

4. Rename the **atapi.000** file to **atapi.sys**.

5. Restart the computer.

CHAPTER 3
Using the System Setup Program

Each time you turn on your computer system or press the reset button, the system compares the hardware installed in the system to the hardware listed in the system configuration information stored in nonvolatile random-access memory (NVRAM) on the system board. If the system detects a discrepancy, it generates error messages that identify the incorrect configuration settings. The system then prompts you to enter the System Setup program to correct the setting.

You can use the System Setup program as follows:

*   To change the system configuration information after you add, change, or remove any hardware in your system

*   To set or change user-selectable options—for example, the time or date on your system

*   To enable or disable all integrated devices in your system

You can *view* the current settings at any time. When you *change* a setting, in many cases you must reboot the system before the change takes effect.

After you set up your system, run the System Setup program to familiarize yourself with your system configuration information and optional settings. For future reference, Dell recommends that you print the System Setup screens (by pressing the <Print Scrn> key) if you have a local printer installed, or write down the information if you do not have a printer.

Before you use the System Setup program, you need to know the kind of diskette drive(s) and hard-disk drive(s) installed in your computer. If you are unsure of any of this information, see the manufacturing test report that was shipped with your system. You can access the manufacturing test report from the **Dell Accessories** program folder.

Entering the System Setup Program

To enter the System Setup program, press the System Setup key combination during the system's power-on self test (POST), as follows:

1. Restart your system.

2. During the boot routine, the message `F2 = Setup` appears on the screen. When the message appears, *immediately* press the <F2> key.

   NOTE: An alternate way to enter the System Setup program is to press the <Ctrl><Alt><Enter> keys instead of the <F2> key.

   The message `Entering Setup` appears and is soon replaced by Page 1 of the System Setup screens.

   If you wait too long to press the <F2> key, the `F2 = Setup` message disappears and your operating system begins to load into memory. If this situation occurs, *let the system complete the load operation;* then shut it down and try again.

   NOTE: To ensure an orderly system shutdown, consult the documentation that accompanied your operating system.

You can also enter the System Setup program by responding to certain error messages. See "Responding to Error Messages" at the end of this chapter.

System Setup Screens

The two System Setup screens, Page 1 and Page 2, display the current setup and configuration information and optional settings for your system. (Typical examples are illustrated in Figure 3-1.) Information on the two System Setup screens is organized in five boxed areas:

- Title box

  The box at the top of both screens lists the page number (Page 1 or Page 2) and the revision number of the basic input/output system (BIOS).

- Configuration options

  The box on the left half of both screens lists the options that define the installed hardware in your computer.

  Fields beside the options contain settings or values. You can change those that appear bright on the screen. Settings or values that you cannot change because they are determined by the system appear less bright.

  Some options have multiple fields, which may show settings or values as bright or less bright depending upon what settings or values you entered in other fields.

- Help

  The box on the upper-right half of both screens displays help information for the option with a currently highlighted field.

- System data

  The box in the lower-right corner of both screens displays information about your system.

- Key functions

  The line of boxes across the bottom of both screens lists keys and their functions within the System Setup program.

Using the System Setup Program

Table 3-1 lists the keys you use to view or change information on the System Setup screens and to exit the program.

Table 3-1. System-Setup Navigation Keys

Keys	Action
[Tab] or [↓]	Moves to the next field.
[Shift] [Tab] or [↑]	Moves to the previous field.
[←] or [→]	Cycles through the settings in a field. In many fields, you can also type the appropriate value.
[Page Down] or [Page Up]	Scrolls through help information.
[Alt] [P]	Switches between Pages 1 and 2.
[Esc]	Exits the System Setup program without rebooting the system and returns the system to its previous state—the boot routine or operating system prompt.
	For most of the options, any changes you make are recorded but do not take effect until the next time you boot the system; for a few (as noted in the help area), the changes take effect immediately.
[Alt] [B]	Exits the System Setup program and reboots the system, implementing any changes you have made.
[Alt] [D]	Restores the default value for the currently selected option.

configuration options   title box   help

```
                       Dell Computer Corporation (www.dell.com)
     Page 1 of 2          Precision WorkStation 210 M Setup      BIOS Version: XXX

  Time:  13:17:02   Date:  Mon April 6, 1998    This category sets the time in
                                                24-hour format (hours:minutes:
   Diskette Drive A:   3.5 inch, 1.44 MB        seconds) for the internal clock/
   Diskette Drive B:   Not Installed            calendar.
  Drives:
  Primary  Type Cyls Hds  Pre  LZ Sec  Size     To change the value in a field,
   Drive 0:Auto 1023  64   -1 1023  63  2111     enter a number or use the left- or
   Drive 1:None                                  right-arrow key.
   Secondary
   Drive 0:Auto        CD-ROM Device             Changes take effect immediately.
   Drive 1:None
                                                 ───────────────────────────────────
   Reserved Memory:     None                       Pentium® II Processors 350 MHz
          CPU Speed:     350 MHz                         CPU IDs: 651, 651
          Num Lock:     On                       Level 2 Cache: 512 KB Integrated
  Chassis Intrusion:    Not Detected             System Memory: 64 MB ECC SDRAM
  Thermal Power-off:    Enabled                     Service Tag: XXXXX
   Video DAC Snoop:     Off                         Asset Tag: XXXXX

  Tab,Shift-Tab change fields |←,→ change values| Alt-P next | Esc exit | Alt-B reboot
```

key functions   system data

```
                       Dell Computer Corporation (www.dell.com)
     Page 2 of 2          Precision WorkStation 210 M Setup      BIOS Version: XXX

   Keyboard Errors:       Report                 This category determines whether
   System Password:      Not Enabled             keyboard-related error messages
   Password Status:       Unlocked               are reported at system startup.
     Boot Sequence:     Diskette First
    Setup Password:      Not Enabled
    Auto Power On:     Disabled 00:00
  Power Management:       Disabled
     Wakeup On LAN:        Off
         ───────── Integrated Devices ─────────
            Sound:        On
              NIC:        Off (PXE Off)
            Mouse:        On                     ───────────────────────────────────
     Serial Port 1:      Auto                      Pentium® II Processors 350 MHz
     Serial Port 2:      Off                             CPU IDs: 651, 651
     Parallel Port:      378h                     Level 2 Cache: 512 KB Integrated
     Parallel Mode:      AT                       System Memory: 64 MB ECC SDRAM
     IDE Hard Disk:      Auto                        Service Tag: XXXXX
          Diskette:      Auto                        Asset Tag: XXXXX
           Speaker:      On
              SCSI:      Off
  Tab,Shift-Tab change fields |←,→ change values| Alt-P next | Esc exit | Alt-B reboot
```

Figure 3-1. System Setup Screens

System Setup Options

The following subsections explain in detail each of the options on the System Setup screens.

Time

Time resets the time on the computer's internal clock.

Time is kept in a 24-hour format (*hours*:*minutes*:*seconds*). To change the time, press the right-arrow key to increase the number in the highlighted field or press the left-arrow key to decrease the number. If you prefer, you can type numbers in each of the appropriate fields.

Date

Date resets the date on the computer's internal calendar.

Your system automatically displays the day of the week corresponding to the settings in the three fields that follow (*month*, *day-of-month*, and *year*).

To change the date, press the right-arrow key to increase the number in the high-lighted field or press the left-arrow key to decrease the number. If you prefer, you can type numbers in the *month* and *day-of-month* fields.

Diskette Drive A and Diskette Drive B

Diskette Drive A and **Diskette Drive B** identify the type(s) of diskette drive(s) installed in your computer. The standard configuration for this system is one 3.5-inch diskette drive installed at the top of the drive cage. This drive is designated **Diskette Drive A** and is normally the only diskette drive in the computer.

If you install a second diskette drive, it is normally designated as **Diskette Drive B**.

The relative positions of the two drive options always match the physical locations of the drives in your computer—the drive listed on top is the top drive in your computer.

The settings are:

- **5.25 Inch, 360 KB**
- **5.25 Inch, 1.2 MB**
- **3.5 Inch, 720 KB**
- **3.5 Inch, 1.44 MB**
- **Not Installed**

Drives: Primary and Secondary

Primary identifies drives attached to the primary enhanced integrated drive electronics (EIDE) interface connector (labeled "IDE1") on the system board; **Secondary** identifies drives connected to the secondary EIDE interface connector (labeled "IDE2").

For both the **Primary** and the **Secondary** drive sections, the **Drive 0** and **Drive 1** options identify the type of EIDE hard-disk drives installed in the computer. For each drive, seven parameters can be chosen as a group by drive-type number, entered individually from the keyboard or set automatically. A *drive-type number* specifies the parameters of a hard-disk drive based on a table recorded in the system's BIOS.

To choose a setting, type characters from the keyboard or use the left- or right-arrow key to cycle through the choices.

The settings are:

- **Auto**
- **None**
- **Usr1** or **Usr2**
- A specific drive-type number

*NOTES: The **Primary** and **Secondary** drive sections identify **only** EIDE drives.*

Operating systems that bypass the system BIOS may not obtain optimum hard-disk drive performance.

EIDE Devices Other Than Hard-Disk Drives

For EIDE CD-ROM drives that use the integrated EIDE controller, it is recommended that you use the secondary EIDE interface connector if a hard-disk drive is attached to the primary EIDE interface connector.

For all EIDE devices, set the appropriate **Drive** option to **Auto**.

EIDE Hard-Disk Drives

For EIDE hard-disk drives, the system provides an automatic drive-type detect feature. To use this feature for **Drive 0**, highlight the **Drive 0** option and type a (for *automatic*). To use it for **Drive 1**, type a at the **Drive 1** option. In each case, the setting changes to **Auto**. After you reboot the system, the System Setup program automatically sets the correct drive parameters for each drive.

Before installing a new EIDE hard-disk drive, also check the documentation that came with the drive to verify that all jumper settings on the drive are appropriate for your configuration.

NOTE: If you are using a hard-disk drive that was shipped by Dell, use the Auto setting.

If You Have a Problem

If the system generates a drive error message the first time you boot your system after installing an EIDE drive, it may mean that your particular drive does not work with the automatic drive-type detect feature. If you suspect that your problem is related to drive type, try entering your drive-type information in one of the following ways:

- If you know the drive-type number, you can type it.

- If you don't know the drive-type number, you can enter your own parameters.

See the next two subsections for instructions.

If You Know the Drive-Type Number

Use the drive-type number you found in the documentation that came with the drive or, if the drive was installed by Dell when you purchased your system, on the manufacturing test report that was shipped with your system.

To set the drive-type number in the System Setup program, highlight the appropriate drive option (**Drive 0** or **Drive 1**) and type the correct drive-type number. If you prefer, you can press the right- or left-arrow key to increase or decrease, respectively, the drive-type number until the correct one is displayed.

If You Do Not Know the Drive-Type Number

The **Drive 0** and **Drive 1** options display the following seven parameters for each drive type:

- **Type** is the drive-type number for the selected hard-disk drive.

- **Cyls** is the number of logical cylinders.

- **Hds** indicates the number of logical heads in the drive.

- **Pre** *(precompensation cylinder)* is the cylinder number at which the electrical current for the drive head changes to compensate for differences in data density across the disk surface (this parameter has no effect for EIDE drives).

- **LZ** is the cylinder number that is used as the drive's landing zone for the heads when the drive is not in use.

- **Sec** is the number of logical sectors per track.

- **Size** (automatically calculated by the system) indicates the number of millions of bytes of storage provided by the drive.

If none of the supported drive types match the parameters of your new drive, you can enter your own parameters. To do so, highlight the appropriate drive option (**Drive 0** or **Drive 1**) and type **u** to display **Usr1**. You can then use the right- or left-arrow key to switch between the **Usr1** and **Usr2** settings. Then press the <Tab> key to highlight each of the parameter fields in succession, and enter the appropriate number for each field. You can have only two user-defined drive types.

*NOTE: The **Usr1** and **Usr2** drive types can be used for both the **Primary** and **Secondary Drive 0** and **Drive 1** options. However, if you select the **Usr1** or **Usr2** drive type, you may not obtain optimum hard-disk drive performance. Also, the **Usr1** and **Usr2** drive types cannot be used for hard-disk drives greater than 528 megabytes (MB) in capacity.*

Reserved Memory

Reserved Memory allows you to designate a region of system board memory that can be supplied by an expansion card. You should not enable the reserved memory feature unless you are using an expansion card that requires special addressing.

For example, you may have a memory expansion card that needs to be addressed starting at 15 MB. Selecting **15M - 16M** for **Reserved Memory** specifies that only part of the base memory comes from the dual in-line memory modules (DIMMs) on the system board, whereas the base memory from 15 MB to 16 MB comes from the memory expansion card.

Reserved Memory has the following settings:

- **None** (the default)
- **15M - 16M**
- **512K - 640K**

CPU Speed

CPU Speed indicates the processor speed at which your system boots.

Press the left- or right-arrow key to toggle **CPU Speed** between the processor's rated speed (the default) and a lower compatibility speed, which lets you accommodate speed-sensitive application programs.

Num Lock

Num Lock determines whether your system boots with the **Num Lock** mode activated on 101- or 102-key keyboards.

When **Num Lock** mode is activated, the rightmost bank of keys on your keyboard provides the mathematical and numeric functions shown at the tops of the keys. When **Num Lock** mode is turned off, each key provides the cursor-control function (if any) indicated at the bottom of the key.

Chassis Intrusion

Chassis Intrusion displays the status of the system's chassis intrusion detector.

If the chassis is opened, the setting changes from **Not Detected** to **Detected** and the following message is displayed during the boot routine at system start-up:

```
Alert! Cover was previously removed.
```

To clear this field and allow future intrusions to be detected, make sure the chassis cover is closed, and then enter the System Setup program during the system's POST, as described earlier in this chapter. At **Chassis Intrusion**, use the left- or right-arrow key to choose **Reset**. This action changes the setting to its default, **Not Detected**.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Thermal Power-Off

Thermal Power-off, when enabled, sets a timer to shut down the system approximately 3 minutes after the system BIOS detects an overtemperature condition for a processor or hard-disk drive. This feature provides a safeguard in the event that another shutdown utility, such as the Dell AutoShutdown service, is not installed or fails to shut the system down after an overtemperature condition.

CAUTION: Disabling Thermal Power-off can result in overheating and damage to the system.

Video DAC Snoop

Video DAC Snoop lets you correct video problems that may occur when certain video expansion cards are used. The default setting, **Off**, improves system compatibility, but may prevent some video expansion cards from working properly.

If you are using a video expansion card and problems such as incorrect colors or blank windows occur, set **Video DAC Snoop** to **On**.

Keyboard Errors

Keyboard Errors enables or disables reporting of keyboard errors during the POST, which is a series of tests that the system performs on the hardware each time you turn on the system or press the reset button.

This option is useful when applied to self-starting servers or host systems that do not have a permanently attached keyboard. In these situations, selecting **Do Not Report** suppresses all error messages relating to the keyboard or to the keyboard controller during POST. This setting does not affect the operation of the keyboard itself, if a keyboard is attached to the computer.

System Password

System Password displays the current status of your system's password security feature and allows you to assign and verify a new password. No one can assign a new password unless the current status is **Not Enabled**, which is displayed in bright characters.

The settings for **System Password** are:

- **Not Enabled** (the default)
- **Enabled** (appears after password has been assigned)

- **Disabled By Jumper** (appears only after the jumper plug has been removed from the PSWD jumper on the system board)

To assign and enable a password, press the left- or right- arrow key, type the password, and press <Enter>. Then retype the password and press <Enter>. If the system beeps when you press a key, the key is illegal for password use. Press the <Esc> key to abort the password entry procedure.

To disable the system password, enter the password during system start-up but do not press <Enter> to continue the system start-up sequence. Instead, simultaneously press the <Ctrl> and <Enter> keys after typing the password.

To change the system password, disable the password (as described above), and then enter the System Setup program and assign a new password.

NOTE: See "Using the System Password Feature" found later in this chapter for detailed instructions on assigning a system password and using or changing an existing system password. See "Disabling a Forgotten Password" found later in this chapter for instructions on disabling a forgotten system password.

Password Status

Password Status provides an extra measure of system security by letting you set the system password to **Locked**.

Using Password Status With a System Password Enabled

When **Password Status** is set to **Unlocked**, any user who already knows the system password can disable the password at system start-up by using <Ctrl><Enter>—thus (inadvertently or not) leaving the system without password protection.

When **Password Status** is set to **Locked** and a user tries to disable the password at system start-up, the following message is displayed:

```
Password locked, not disabled
```

To provide maximum security for your system, operate the system with **System Password Enabled**, **Setup Password Enabled**, and **Password Status Locked**. Then, if you want to let selected individuals use your system, give them the system password *but not the setup password.* In this way, even those who know the system password cannot disable it at system start-up and will not be able to unlock it in the System Setup program to change or disable it.

Using Password Status Without a System Password Enabled

In situations where the network administrator does not want to use a system password, **Password Status** can be used to guard against a user assigning a password. With **Password Status Locked** and **Setup Password Enabled**, a user who does not know the setup password cannot enter the System Setup program to unlock the system password and assign one.

Boot Sequence

Boot Sequence can be set to **Diskette First** (the default), **Hard Disk Only**, **CD-ROM First**, or **Device List**.

The term *boot* refers to the system's start-up procedure. When turned on, the system "bootstraps" itself into an operational state by loading into memory a small program, which in turn loads the necessary operating system. **Boot Sequence** tells the system where to look for the files that it needs to load.

Diskette First

Selecting **Diskette First** causes the system to try booting from drive A first. If the system finds a diskette that is not bootable in the drive or finds a problem with the drive itself, it displays an error message. If it does not find a diskette in the drive, the system tries to boot from the hard-disk drive (drive 0), then from the CD-ROM drive, and finally from the Plug and Play network adapters in the order found.

Hard Disk Only

Selecting **Hard Disk Only** causes the system to attempt to boot first from the hard-disk drive and then from the Plug and Play network adapters in the order found. The system will not attempt to boot from drive A or the CD-ROM drive.

CD-ROM First

Selecting **CD-ROM First** causes the system to try booting from the CD-ROM drive first. If the system finds a CD that is not bootable in the drive or finds a problem with the drive itself, it displays an error message. If it does not find a CD in the drive, the system tries to boot from drive A, then from drive C, and finally from the Plug and Play network adapters in the order found.

Device List

Device List provides access to the **Device List** screen (see Figure 3-2), where you can choose from a list of available boot devices and specify the order in which your computer attempts to boot from these devices. To view the **Device List** screen, press <Ctrl> and the right-arrow key.

> **CAUTION: Only a technically knowledgeable person should change the settings in the Device List screen.**

The **Device List** screen provides three options for listing and prioritizing the available boot devices on your system:

- **Boot Device Priority**
- **Exclude From Boot Device Priority**
- **Device Controller Priority**

Boot Device Priority lists all bootable devices (hard-disk drives, CD-ROM drives, and so on) that are controlled by the system BIOS and any Plug and Play network adapters installed in the system.

Exclude From Boot Device Priority allows you to remove from **Boot Device Priority** any boot devices that you want the system to ignore during system start-up.

Device Controller Priority lists the system BIOS controller; any non-Plug and Play devices, such as network adapter cards; and any secondary controller cards installed in the system.

NOTE: Non-Plug and Play devices appear in the list as `Adapters without ID support`*.*

When determining the order of devices to boot from, the system first considers the order of the devices listed under **Device Controller Priority** and then considers the order of devices under **Boot Device Priority**.

```
                    Dell Computer Corporation (www.dell.com)
 Device List        Precision WorkStation 210 M Setup        BIOS Version: XXX
 ─────────────────────────────────────────────────────────────────────────────
 Boot Device Priority:                    │ The DEVICE LIST contains devices
 Diskette drive A                         │ that may be bootable. The system
 Hard drive C:                            │ attempts to boot from the devices
 CD-ROM device                            │ in the list as ordered. If you
                                          │ ESC or ALT-B from this menu, the
                                          │ displayed order becomes the boot
                                          │ selection.
 Exclude from Boot Device Priority:       │
                                          │ Ctrl-Ins moves items between "Boot
                                          │ Device Priority" and "Exclude
                                          │ from Boot Device Priority" only.
                                          ├────────────┬──────────┬───────────
                                          │ PgDn next  │ 1 of 2   │  PgUp prev
 Device Controller Priority:             ├────────────┴──────────┴───────────
                                          │    Pentium® II Processors 350 MHz
                                          │        CPU IDs: 651,651
 System BIOS boot devices                 │ Level 2 Cache: 512 KB Integrated
                                          │ System Memory: 64 MB ECC SDRAM
                                          │    Service Tag: XXXXX
                                          │      Asset Tag: XXXXX
 ─────────────────────────────────────────────────────────────────────────────
 Ctrl-Del original list │ Ctrl ↑, ↓ move item │ Ctrl ← return │ Ctrl-Ins move to other list
```

Figure 3-2. Sample Device List Screen

To specify your priority preferences, order the devices under these options so that the highest-priority controller is at the top of **Device Controller Priority** and the highest-priority device is at the top of **Boot Device Priority**. Order the remainder of the devices in **Boot Device Priority** according to your preferences. Move any devices that you want the system to ignore during start-up into **Exclude From Boot Device Priority**.

*NOTE: The system defines drive C in **Boot Device Priority** as the first hard-disk drive attached to the highest-priority device controller.*

To change the order of the devices, press <Ctrl> and the up- or down-arrow key. If you want to revert to the original **Boot Device Priority** settings, press <Ctrl><Del>.

*NOTE: If you exit the **Device List** screen by pressing <Esc> or <Alt><b> without making any changes, **Boot Sequence** is set to **Device List**.*

Setup Password

Setup Password lets you restrict access to your computer's System Setup program in the same way that you restrict access to your system with the system password feature. The settings are:

- **Not Enabled** (the default)
- **Enabled**
- **Disabled by Jumper**

NOTE: Read "Using the Setup Password Feature" found later in this chapter for instructions on assigning a setup password and using or changing an existing setup password. See "Disabling a Forgotten Password" found later in this chapter for instructions on disabling a forgotten setup password.

Auto Power On

Auto Power On allows you to turn on your computer system automatically. You can set **Auto Power On** to turn on the system either every day or every Monday through Friday at a preset time.

NOTE: This feature will not work if you turn off your system using a power strip or surge protector.

Select **Everyday** or **Mon–Fri**, and then use the down-arrow key to highlight first the hours field and then the minutes field. Time is kept in a 24-hour format (*hours:minutes*). To change the start-up time, press the right-arrow key to increase the number in the highlighted field or press the left-arrow key to decrease the number. If you prefer, you can type numbers in both fields.

The default for **Auto Power On** is **Disabled**.

Power Management

For certain types of monitors and most EIDE hard-disk drives, you can reduce system power consumption by enabling the power management feature. With **Power Management** enabled, these monitors and drives automatically switch into low-power mode during periods of system inactivity.

Power Management can be implemented at three levels—**Maximum**, **Regular**, and **Minimum**. (The different levels apply to the monitor only; hard-disk drive operation is the same for all three.) The feature can also be set to **Disabled**.

Saving Monitor Power

If you have a Video Electronics Standards Association (VESA®) Display Power Management Signaling (DPMS)-compliant monitor, enabling **Power Management** reduces monitor power consumption during periods of keyboard and mouse inactivity.

CAUTION: Check your monitor documentation to make sure you have a DPMS-compliant monitor before you enable this feature. Otherwise, you risk damaging the monitor.

NOTES: Some 3D graphics cards do not support DPMS. Refer to the documentation for your particular 3D graphics card for information.

The power management feature monitors activity of a mouse connected to the Personal System/2 (PS/2)-compatible mouse port.

By setting **Power Management** to **Maximum**, **Regular**, or **Minimum**, you can set predefined time-out periods (see Table 3-2) for the two successive monitor shutdown stages, *standby* and *off*.

NOTE: Each monitor manufacturer defines the details of the shutdown stages for its own monitors. But in all cases, power consumption decreases with each stage from "on" (full power) to "standby" (reduced power; the display image usually disappears) to "off" (where power consumption is minimal). To define these stages for your monitor, see the documentation that came with the monitor.

For most DPMS-compliant monitors, any subsequent activity—including moving the mouse—returns full power to the monitor.

Check your monitor documentation for information on how your monitor is designed to operate.

Table 3-2. Power Time-Out Periods

Power Management Setting	EIDE Drive Spindown Time-Outs	Monitor Standby Time-Outs	Monitor Off Time-Outs
Disabled	Never	Never	Never
Maximum	20 minutes	10 minutes	1 hour
Regular	20 minutes	20 minutes	1 hour
Minimum	20 minutes	1 hour	Never

Saving EIDE Hard-Disk Drive Power

For most systems, enabling **Power Management** at any level causes EIDE hard-disk drives to switch to low-power mode after about 20 minutes of system inactivity.

*NOTE: Not all EIDE hard-disk drives support this feature. Enabling this feature for drives that do not support it may cause the EIDE drive to become inoperable until the computer is restarted and **Power Management** is disabled.*

In low-power mode, the disks inside the drive stop spinning. They remain idle until the next drive access, which causes them to start spinning again. (Because the disks take a few seconds to regain full speed, you may notice a slight delay when you next access the hard-disk drive.)

When **Power Management** is **Disabled** (the default), the disks spin constantly as long as the system is turned on.

Wakeup On LAN

Wakeup On LAN determines whether the Wakeup On LAN feature is set. The settings for **Wakeup On LAN** are:

- **Off**
- **On (Add-in NIC)**
- **On (Integrated NIC)**

If **On (Add-in NIC)** or **On (Integrated NIC)** is set, the system can be started up by a special local area network (LAN) signal from a server management console. Wakeup On LAN capability also allows remote computer setup, BIOS upgrades, software downloading and installation, file updates, and asset tracking after hours and on weekends when LAN traffic is typically at a minimum.

NOTE: The Wakeup On LAN feature functions even when the computer is turned off; however, the computer must be plugged into a working electrical outlet at all times and must be shut down in the normal method expected by the operating system. Thus, if you disconnect the system power cable from its electrical outlet, if a power failure occurs, or if you shut down the system abnormally, the Wakeup On LAN feature will not work.

Sound

Sound determines whether the integrated audio controller is **On** (the default) or **Off**. When **Sound** is set to **Off**, no sounds are emitted from any attached external speakers or from the on-board speaker, except for beep codes. Set **Sound** to **Off** if you want to use a sound expansion card instead of the integrated audio controller or if you need the resources used by the controller.

NIC

The following user-selectable settings for the **NIC** option determine the state of the integrated NIC:

- **On (PXE Off)** — NIC is enabled but not set to boot the system remotely from the Preboot eXecution Environment (PXE) on a network server.
- **On** — NIC is enabled and PXE is set to allow the system administrator to update the system remotely.
- **Off** — NIC is disabled.

Mouse

Mouse enables or disables the system's integrated PS/2-compatible mouse port. Disabling the mouse allows an expansion card to use interrupt request (IRQ) 12.

Serial Port 1 and Serial Port 2

Serial Port 1 and **Serial Port 2** configure the system's integrated serial ports. These options can be set to **Auto** (the default) to automatically configure a port, to a particular designation (**COM1** or **COM3** for **Serial Port 1** and **COM2** or **COM4** for **Serial Port 2**), or to **Off** to disable the port.

If you set a serial port to **Auto** and add an expansion card containing a port configured to the same designation, the system automatically remaps the integrated port to the next available port designation that shares the same IRQ setting:

- COM1 (input/output [I/O] address 3F8h), which shares IRQ4 with COM3, is remapped to COM3 (I/O address 3E8h).
- Likewise, COM2 (I/O address 2F8h), which shares IRQ3 with COM4, is remapped to COM4 (I/O address 2E8h).

(Note that when two COM ports share an IRQ setting, you can use either port as necessary, but *you may not be able to use them both at the same time*.) If the second port (COM3 or COM4) is also in use, the integrated port is turned off.

For more information about integrated ports, port designations, IRQs, and the remapping of ports, see "I/O Ports and Connectors" in Appendix B.

Parallel Port

Parallel Port configures the system's integrated parallel port. **Parallel Port** can be set to **378h**, to alternate addresses **278h** or **3BCh,** or to **Off** to disable the port.

The default is 378h; you should leave it at that setting unless an expansion card needs to use that address.

Parallel Mode

Parallel Mode controls whether the system's integrated parallel port acts as an AT-compatible (unidirectional) or PS/2-compatible (bidirectional) port.

Your system also supports Extended Capabilities Port (ECP) mode, which can be used by the Windows 95 or Windows 98 operating system. Windows 95 and Windows 98 use the ECP protocol automatically if an ECP-capable device is detected.

Set **Parallel Mode** according to the type of peripheral device connected to the parallel port. To determine the correct mode to use, see the documentation that came with the device.

IDE Hard Disk

IDE Hard Disk enables or disables the system's integrated EIDE hard-disk drive interface.

With **Auto** (the default) selected, the system turns off the integrated EIDE interface as necessary to accommodate a controller card installed in an expansion slot.

As part of the boot routine, the system first checks for a *primary* hard-disk drive controller card installed in an expansion slot. If no card is found, the integrated EIDE interface is enabled and the controller on the master EIDE drive is designated as the primary controller, using IRQ14. If any EIDE drives are attached to the secondary EIDE channel, IRQ15 is also used.

If a primary controller is detected on the expansion bus, the integrated EIDE interface is disabled.

Selecting **Off** disables the integrated EIDE interface.

Diskette

Diskette controls the operation of the system's integrated diskette drive controller.

With **Auto** (the default) selected, the system turns off the integrated diskette drive controller as necessary to accommodate a controller card installed in an expansion slot.

With **Write-Protect** selected, nothing can be written to diskette drives using the system's integrated diskette drive controller. (The system can still read from the drives.) When **Write-Protect** is selected, the **Auto** setting is also in effect (the system turns off the integrated diskette drive controller as necessary).

Selecting **Off** turns off the integrated diskette drive controller; this setting is used primarily for troubleshooting purposes.

Speaker

Speaker determines whether system sounds (other than beep codes) are emitted by the integrated speaker. A change takes effect immediately (rebooting the system is not required).

However, even with **Speaker** set to **Off**, sounds from the integrated audio controller will be emitted by the integrated speaker. To disable the integrated speaker completely, follow these steps:

1. Start the Windows 95, Windows 98, or Windows NT operating system.

2. Double-click the speaker icon in the right corner of the task bar.

3. From the **Master Out** panel, select **Advanced Controls** from the **Options** menu.

4. Click the **Advanced** button under the **Master Out** column.

5. Click the **PC Speaker Mute** check box.

System Data

The following fields, which are not selectable, display information about the system:

- The first field displays the type of microprocessor installed in the computer.

- The three-digit number in the **CPU IDs** field indicates the family and model of the microprocessor that is installed in the computer. This information is useful for troubleshooting problems with the microprocessor.

- **Level 2 Cache** displays the amount of integrated level-2 (L2) cache memory in the single-edge contact (SEC) cartridge.

- **System Memory** indicates the entire amount of installed memory detected in your system, except for memory on Expanded Memory Specification (EMS) expansion cards.

  After adding memory, check **System Memory** to confirm that the new memory is installed correctly and is recognized by the system.

- **Service Tag** displays the system's five-character service tag number, which was programmed into NVRAM by Dell during the manufacturing process. Refer to this number during technical assistance or service calls. The service tag number is also accessed by certain Dell support software, including the diagnostics software.

- **Asset Tag** displays the customer-programmable asset tag number for the system if an asset tag number has been assigned. You can use the Asset Tag utility, which is included with your software support utilities, to enter an asset tag number of up to ten characters into NVRAM. For information on using the utility, see "Asset Tag Utility" in Chapter 2.

Using the System Password Feature

CAUTION: The password features provide a basic level of security for the data on your system. However, they are not foolproof. If your data requires more security, it is your responsibility to obtain and use additional forms of protection, such as data encryption programs.

Your Dell system is shipped to you without the system password feature enabled. If system security is a concern, you should operate your system only with system password protection.

You can assign a system password, as described in the next subsection, "Assigning a System Password," whenever you use the System Setup program. After a system password is assigned, only those who know the password have full use of the system.

When **System Password** is set to **Enabled**, the computer system prompts you for the system password just after the system boots.

To change an existing system password, you must either know the password or have access to the inside of the computer (see "Deleting or Changing an Existing System Password" found later in this section).

If you assign and later *forget* a system password, you need your computer key to get inside the chassis, where you can change a jumper setting to disable the system password feature (see "Disabling a Forgotten Password" found later in this chapter). Note that you erase the *setup password* at the same time.

CAUTION: If you leave your system running and unattended without having a system password assigned or if you leave your computer unlocked so that someone can disable the password by changing a jumper setting, anyone can access the data stored on your hard-disk drive.

Assigning a System Password

Before you can assign a system password, you must enter the System Setup program and check the **System Password** status.

With a system password assigned, the status shown in **System Password** is **Enabled**. With the system password feature disabled by a jumper setting on the system board, the status shown is **Disabled By Jumper**. *You cannot change or enter a new system password if either of these settings is displayed.*

With no system password assigned and with the password jumper on the system board in the enabled position (its default), the status shown for **System Password** is **Not Enabled**. *Only when **System Password** is set to **Not Enabled** can you assign a system password,* using the following procedure:

1. Verify that **Password Status** is set to **Unlocked**.

   For instructions on changing the setting for **Password Status**, see "Password Status" found earlier in this chapter.

2. Press the left- or right-arrow key.

   The heading changes to **Enter Password**, followed by an empty seven-character field in square brackets.

3. Type the new system password.

   You can use up to seven characters in the password.

   As you press each character key (or the spacebar for a blank space), a placeholder appears in the field.

   The password assignment operation recognizes keys by their location on the key-board, without distinguishing between lowercase and uppercase characters. For example, if you have an *M* in your password, the system recognizes either *M* or *m* as correct.

   Certain key combinations are not valid. If you enter one of these combinations, the speaker emits a beep.

   To erase a character when entering your password, press the <Backspace> key or the left-arrow key.

NOTE: To escape from the field without assigning a system password, press the <Tab> key or the <Shift><Tab> key combination to move the highlight to another field or press the <Esc> key at any time prior to completing step 5.

4. Press <Enter>.

   If the new system password is less than seven characters, the whole field fills with placeholders. Then the heading changes to **Verify Password**, followed by another empty seven-character field in square brackets.

5. To confirm your password, type it a second time and press <Enter>.

   The password setting changes to **Enabled**. Your system password is now set; you can exit the System Setup program and begin using your system. Note, however, that password protection does not take effect until you reboot the system by pressing the reset button or by turning the system off and then on again.

Using Your System Password to Secure Your System

Whenever you turn on your system, press the reset button, or reboot the system by pressing the <Ctrl><Alt><Del> key combination, the following prompt appears on the screen when **Password Status** is set to **Unlocked**:

```
Type in the password and...
— press <ENTER> to leave password security enabled.
— press <CTRL><ENTER> to disable password security.
Enter password:
```

If **Password Status** is set to **Locked**, the following prompt appears:

```
Type the password and press <Enter>.
```

After you type the correct system password and press <Enter>, your system boots and you can use the keyboard to operate your system as usual.

NOTE: If you have assigned a setup password (see "Using the Setup Password Feature" found later in this chapter), the system accepts your setup password as an alternate system password.

If a wrong or incomplete system password is entered, the following message appears on the screen:

```
** Incorrect password. **
```

```
Enter password:
```

If an incorrect or incomplete system password is entered again, the same message appears on the screen.

The third and subsequent times an incorrect or incomplete system password is entered, the system displays the following message:

```
** Incorrect password. **
Number of unsuccessful password
attempts: 3
System halted!  Must power down.
```

The number of unsuccessful attempts made to enter the correct system password can alert you that an unauthorized person has attempted to use your system.

Even after your system is turned off and on, the previous message is displayed each time an incorrect or incomplete system password is entered.

NOTE: You can use **Password Status** *in conjunction with* **System Password** *and* **Setup Password** *to further protect your system from unauthorized changes. For more information, see "Password Status" found earlier in this chapter.*

Deleting or Changing an Existing System Password

To delete or change an existing system password, perform the following steps:

1. Enter the System Setup program and verify that **Password Status** is set to Unlocked.

    Enter the System Setup program by pressing the <Ctrl><Alt><Enter> key combination. Press the <Alt><p> key combination to move to Page 2 of the System Setup screens. For instructions on changing the setting for **Password Status**, see "Password Status" found earlier in this chapter.

2. Reboot your system to force it to prompt you for a system password.

3. When prompted, type the system password.

4. Press the <Ctrl><Enter> key combination to disable the existing system password, instead of pressing <Enter> to continue with the normal operation of your system.

5. Reboot the system and enter the System Setup program as described in "Entering the System Setup Program" found earlier in this chapter.

6. Confirm that **Not Enabled** is displayed for **System Password** in the System Setup program.

    If **Not Enabled** appears, the system password has been deleted. If you want to assign a new password, go to step 7.

    If **Not Enabled** is *not* displayed, press the <Alt><b> key combination to reboot the system, and then repeat steps 3 through 6.

7. To assign a new password, follow the procedure in "Assigning a System Password" found earlier in this section.

Using the Setup Password Feature

Your Dell system is shipped to you without the setup password feature enabled. If system security is a concern, you should operate your system with setup password protection.

You can assign a setup password, as described in the next subsection, "Assigning a Setup Password," whenever you use the System Setup program. After a setup password is assigned, only those who know the password have full use of the System Setup program.

To change an existing setup password, you must know the setup password (see "Deleting or Changing an Existing Setup Password" found later in this section). If you assign and later *forget* a setup password, you need your computer key to get inside the chassis, where you can change a jumper setting to disable the password feature (see "Disabling a Forgotten Password" found later in this chapter). Note that you erase the *system password* at the same time.

Assigning a Setup Password

A setup password can be assigned (or changed) only when **Setup Password** is set to **Not Enabled**. To assign a setup password, highlight **Setup Password** and press the left- or right-arrow key. The system prompts you to enter and verify the password. If a character is illegal for password use, the system emits a beep.

NOTES: The setup password can be the same as the system password.

If the two passwords are different, the setup password can be used as an alternate system password. However, the system password cannot be used in place of the setup password.

After you verify the password, the **Setup Password** setting changes to **Enabled**. The next time you enter the System Setup program, the system prompts you for the setup password.

A change to **Setup Password** becomes effective immediately (rebooting the system is not required).

Operating With a Setup Password Enabled

If **Setup Password** is set to **Enabled**, you must enter the correct setup password before you can modify the majority of the System Setup options.

When you start the System Setup program, Page 2 of the System Setup screens appears with **Setup Password** highlighted, prompting you to type the password.

If you do not enter the correct password in three tries, the system lets you view, but not modify, the System Setup screens—with the following exceptions:

- You can still modify **Date**, **Time**, **CPU Speed**, **Num Lock**, and **Speaker**.
- If **System Password** is not enabled and is not locked via **Password Status**, you can assign a system password (however, you cannot disable or change an existing system password).

*NOTE: You can use **Password Status** in conjunction with **Setup Password** to protect **System Password** from unauthorized changes. For more information, see "Password Status" found earlier in this chapter.*

Deleting or Changing an Existing Setup Password

To delete or change an existing setup password, perform the following steps:

1. Enter the System Setup program.

2. Highlight **Setup Password**, and press the left- or right-arrow key to delete the existing setup password.

   The setting changes to **Not Enabled**.

3. If you want to assign a new setup password, follow the procedure in "Assigning a Setup Password" found earlier in this section.

Disabling a Forgotten Password

If you forget your system or setup password, you cannot operate your system or change settings in the System Setup program, respectively, until you open the computer, change the password jumper setting to disable the passwords, and erase the existing passwords.

To disable a forgotten password, perform the following steps:

1. Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 8.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

2. Refer to "Jumpers" in Appendix B for jumper information and to Figure B-1 for the location of the password jumper (labeled "PSWD") on the system board.

3. Remove the jumper plug from the PSWD jumper (the disable setting).

4. Replace the computer cover.

5. Reconnect your computer to its power source, and turn it on.

   Booting your system with the PSWD jumper plug removed erases the existing password(s).

NOTE: Before you assign a new system and/or setup password, you must replace the PSWD jumper plug.

6. Repeat step 1.

7. Replace the PSWD jumper plug (the enable setting).

8. Replace the computer cover, and then reconnect the computer and peripherals to their power sources and turn them on.

   Booting with the PSWD jumper installed reenables the password features. When you enter the System Setup program, both password fields appear as **Not Enabled**, meaning that password protection is no longer available because no passwords have been assigned.

9. Assign a new system and/or setup password.

   To assign a new system password, see "Assigning a System Password" found earlier in this chapter. To assign a new setup password, see "Assigning a Setup Password" found earlier in this chapter.

10. Reset the chassis intrusion detector.

    See "Chassis Intrusion" found earlier in this chapter.

Responding to Error Messages

If an error message appears on your monitor screen while the system is booting, make a note of the message. Then, before entering the System Setup program, refer to your *Diagnostics and Troubleshooting Guide* for an explanation of the message and suggestions for correcting any errors. (However, it is normal to receive an error message the first time you boot the system after a memory upgrade. In that case, you do not need to refer to the *Diagnostics and Troubleshooting Guide*—follow the instructions in "Adding Memory" in Chapter 8 of this guide.)

If you are given an option of pressing either <F1> to continue or <F2> to run the System Setup program, press the <F2> key.

C H A P T E R 4

Using the ISA Configuration Utility

The ISA Configuration Utility (ICU) is used by the system to track what expansion cards are installed and what resources are used. With this information, the system automatically configures Plug and Play expansion cards and Peripheral Component Interconnect (PCI) expansion cards and can tell you how to configure non-Plug and Play Industry-Standard Architecture (ISA) expansion cards manually by setting jumpers or switches. Plug and Play and PCI expansion cards do not contain jumpers and switches; they are configured only through software in the basic input/output system (BIOS).

CAUTION: The ICU is intended only for configuring non-Plug and Play ISA expansion cards. It should not be used for assigning resources to Plug and Play expansion cards and PCI expansion cards. These cards should be configured automatically by the BIOS.

NOTE: The Windows NT operating system does not provide full Plug and Play support. Therefore, some Plug and Play cards (such as modem, sound, and network cards) may not work with Windows NT. If your system is running a Dell-installed Windows NT operating system and you want to use Plug and Play cards, Dell recommends that you use the card manufacturer's configuration utility to set the card to legacy mode, enter the card's resources through the manufacturer's utility, and then use the ICU to add the Plug and Play card to your system configuration. On systems with a Dell-installed Windows NT operating system, the ICU is installed on the hard-disk drive as a diskette image. Use the Program Diskette Maker (located in the **Dell Accessories** *program folder) to make an ICU diskette from this diskette image.*

The remainder of this chapter describes the various features of, and the various ways to use, the ICU.

Quick Start

To quickly get started using this utility, follow these steps:

1. Determine whether you need to run the ICU.

    See "When to Run the ICU" found later in this chapter for detailed instructions.

2. Perform any required preparatory steps before starting the utility.

    Preparatory steps include making a program diskette, copying your mouse driver to this diskette, and making a backup copy of this diskette. See "Preparing to Use the ICU" found later in this chapter for detailed instructions.

3. Start the system using your ICU diskette.

    Verify that **Boot Sequence** in the System Setup program is set to **Diskette First**. Then insert the backup copy of the ICU diskette into drive A, and turn on your computer or press the reset button.

    NOTE: The ICU takes a few minutes to load. During this time, the cursor may appear as a pointer rather than as an hourglass.

    When the utility has finished loading, the ICU window (see Figure 4-1) is displayed.

4. Add, modify, or remove a card, or view resources for a card or other device.

    Depending on what you need to accomplish with the ICU, you may need to perform one or more of these tasks:

    *   If you are adding a non-Plug and Play ISA expansion card, see "Adding a Listed Card" found later in this chapter for detailed instructions. If the card you are adding does not have a configuration file, see "Adding an Unlisted Card" found later in this chapter for detailed instructions.

    *   If you are modifying a card that is already installed, see "Modifying a Card" found later in this chapter for detailed instructions.

    *   If you are removing a card, see "Removing a Card" found later in this chapter for detailed instructions.

    *   If you want to examine the resources already assigned in the system, see "Viewing Resources" found later in this chapter for detailed instructions.

5. Save your configuration, and exit the utility.

    See "Saving the System Configuration" and "Exiting the ICU" found later in this chapter for detailed instructions.

About the ICU

Before your system was shipped from Dell, a technician used the ICU to enter the correct information for the expansion cards initially installed in your computer.

If your system was shipped with Dell-installed software, the ICU diskette image (from which you can make an ICU diskette) is installed on your hard-disk drive. (Your system may also be accompanied by an *ISA Configuration Utility Diskette*.)

The ICU is also available through online services such as Dell's TechConnect bulletin board service (BBS). See the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* for information on accessing the BBS.

Whenever you add or remove a non-Plug and Play ISA expansion card, use the ICU to reconfigure your system. The utility reads the card's corresponding configuration file (**.cfg** file), which describes the card's characteristics and required system resources. After the resources identified in these configuration files are assigned to all non-Plug and Play ISA expansion cards, the system assigns resources to all Plug and Play expansion cards, as well as PCI expansion cards, thereby creating a conflict-free configuration.

ICU Database

The ICU provides a database of configuration files for a large variety of non-Plug and Play ISA expansion cards. The database is located in the **\db** subdirectory. *Listed cards* are non-Plug and Play ISA expansion cards that have configuration files stored in this database.

Unlisted cards are non-Plug and Play ISA expansion cards that do not have configuration files stored in the ICU database. Unlisted cards are not displayed in the list of cards provided for the various card categories. The unlisted cards may be cards for which no configuration file exists or new cards that include a manufacturer-supplied configuration file on diskette.

When you supply a configuration file and the ICU is running from the hard-disk drive, the configuration file is copied to the directory that contains the rest of the ICU database.

When to Run the ICU

Whenever you add or remove non-Plug and Play ISA expansion cards, you must run the ICU to ensure that no two cards attempt to use the same resources (such as interrupt request [IRQ] lines).

Run the program *before* adding or removing any non-Plug and Play ISA expansion cards. The ICU can identify and resolve any resource conflicts and indicate the proper jumper and switch settings for each expansion card to avoid such conflicts. Running the program first helps you determine how to configure a non-Plug and Play ISA expansion card before you install it in your computer.

After you have run the ICU for your non-Plug and Play ISA expansion cards and it has configured all your Plug and Play and PCI expansion cards, you can use the utility to *lock* the configuration of your Plug and Play and PCI expansion cards so that they are always assigned the same resources. See "Locking and Unlocking Cards" found later in this chapter for details.

Preparing to Use the ICU

Before using the ICU for the first time, you must complete the following steps:

1. If your system includes Dell-installed software, make a program diskette of the ICU from the diskette image on your hard-disk drive.

    For instructions on how to create a program diskette from the diskette image, see the online help provided in the Program Diskette Maker, which is available in the **Dell Accessories** program folder.

    NOTE: If you received an ISA Configuration Utility Diskette *with your system, skip to step 2.*

2. If you want to use your mouse with the ICU, copy your mouse driver file (**mouse.exe**) to your ICU diskette.

3. Make a backup copy of your ICU diskette, as described in the next subsection, "Backing Up the ICU Diskette."

    Use the backup copy whenever you run the utility; store the original diskette in a safe place.

Backing Up the ICU Diskette

Before using the ICU, make a backup copy of the ICU diskette by performing the following steps.

NOTE: If you received an ISA Configuration Utility Diskette *with your system, you should use this procedure to create a backup of that diskette.*

1. Make sure you have a blank, high-density, 3.5-inch diskette.

2. Turn on your computer system if it is not already on.

3. Make a copy of the ICU program diskette.

    See your operating system documentation for instructions on making a copy of a diskette.

4. Store your original ICU diskette in a safe place.

    Use only the backup diskette when running the ICU.

Starting the ICU

After you have completed the procedure in "Preparing to Use the ICU" found earlier in this chapter, insert the backup copy of the ICU diskette into drive A. Then either turn on your computer or reboot it by pressing the reset button.

Accessing Help

You can access online help in the ICU in four ways:

- Select **Contents** from the **Help** menu to display a list of topics. Select a topic and click **Help**. Help text on that topic appears in a dialog box.

- For most dialog boxes, you can click **Help** to display information on the action you are performing.

- From the ICU window, press the <F1> key to display a list of available help topics.

- To redisplay the last message you received from the ICU, select **Previous Message** from the **Help** menu.

Making Selections in the ICU

The ICU window is the main window of the utility and the starting point for making expansion-card changes. This window lists all non-Plug and Play ISA, Plug and Play, and PCI expansion cards currently installed in the computer. The ICU window contains menus and a tool bar, as shown in Figure 4-1. When you choose a course of action, the ICU displays dialog boxes to guide you through the various steps.
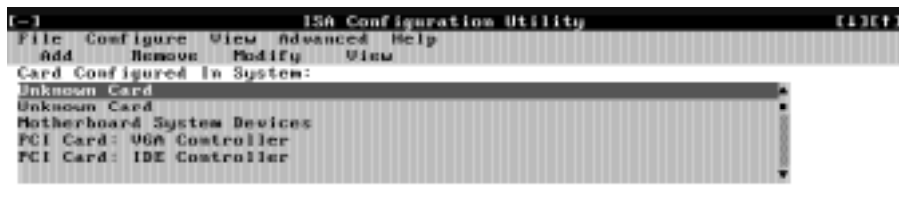
Figure 4-1. ICU Window

You can maneuver through each menu and dialog box using a mouse. If a mouse is not available, you can use the keys shown in Table 4-1.

Each menu and menu option has an underlined character in its name; when you press the <Alt> key in conjunction with the key for the underlined character, that menu or menu option is selected.

Table 4-1. ICU Keys

Keys	Action
<Alt><x><y>	Displays the menu containing the underlined letter *x* and performs the operation indicated by the menu item containing the underlined letter *y*. For example, to save a file (that is, to display the **File** menu and select the **Save** menu option), press <Alt><f> and <S>.
<Tab>	Moves from one control button or list to another.
Up- and down-arrow keys	Moves up and down through items in a list.
<Spacebar>	Highlights an item in a list.
<Enter>	Selects the highlighted button or item in a list.

Adding a Listed Card

NOTE: If you want to add a configuration file that you received on diskette with a new expansion card, you must copy the configuration file to the **\db** *subdirectory on the backup copy of the ICU diskette. You should then reboot your system and perform the following procedure to add the expansion card.*

Use the following procedure to add a listed card with the ICU:

1. Start the ICU as described in "Starting the ICU" found earlier in this chapter.

2. From the ICU window, click **Add** or select **Add Card** from the **Configure** menu.

3. Click the name of the category of card that you want to add. If you clicked **Add** in step 2, click **OK**.

   A dialog box like the one in Figure 4-2 appears, listing the names of all available cards of that type.
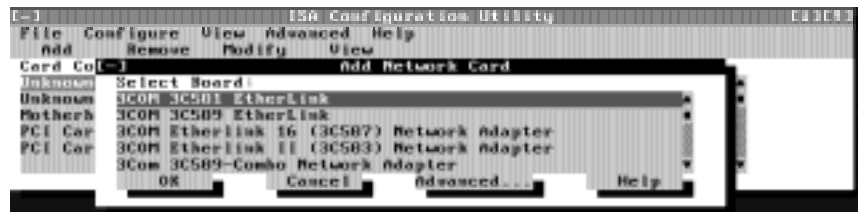
Figure 4-2. Add Network Card Dialog Box

4. Select the name of the card you want to add.

   If the card is not listed, see "Adding an Unlisted Card" found next in this chapter.

5. If you want the ICU to select the resources for the card, click **OK**. Otherwise, skip to step 6.

    The ICU uses the default resources set by the card manufacturer whenever possible. If the ICU cannot find a resource that is valid for the card and available in the system, the utility generates an error message. See Appendix C, "ISA Configuration Utility Messages," for an explanation of the message and a possible solution to the conflict.

    If you are satisfied with the default resources assigned to the card, you can skip the remainder of this procedure.

6. To select the resources yourself, click **Advanced**.

    The **Card Configuration** dialog box (see Figure 4-3) displays all resources used by the card. Some cards have multiple functions, each having one or more resources associated with it. For example, a communications card can have fax, modem, and scanner functions, each of which may have one or more associated resources.

Figure 4-3. Card Configuration Dialog Box

7. To change any of the resource settings for the card, select the resource setting and then click **Settings**.

    The **Configuration Settings** dialog box (see Figure 4-4) displays the name of the resource that you selected in the upper-left corner of the box. The resource values currently associated with the selected function are displayed in the **Resources for Choice** box. The resource values displayed are **IRQ**, **DMA**, **Memory (Hex)**, and **I/O Port (Hex)**.

Figure 4-4. Configuration Settings Dialog Box for Assigning an IRQ Line

8. To change the resource settings, click the down-arrow next to the **Configuration Choice** box. Then click the new resource setting from the list of available settings (see Figure 4-5).

    You cannot manually enter a value; you must choose a setting from the list. If there is only one setting listed, no other settings are available.

    The setting that you select may affect the resources available. For example, if you are offered the **Disabled** option and select it, all resource values are blank, indicating that a disabled setting uses no resources.

Figure 4-5. Available Settings List Box

9. To change individual resource values for the current configuration setting, select the resource value that you want to change and click the **Options** button located below the resource values (see Figure 4-6).

    For example, when you click the value under **DMA**, the **Options** button changes to the **DMA Options** button. When you click this button, a smaller dialog box appears. By clicking the down arrow next to the current resource value, you can display a list of the available values for the resource.
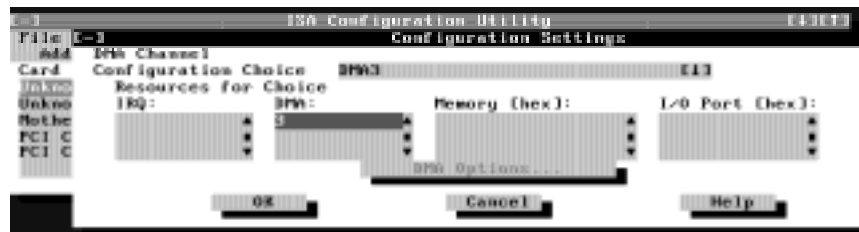
Figure 4-6. Configuration Settings Dialog Box for Assigning a DMA Channel

Choose the desired value and click **OK**. The value you selected is displayed under the resource heading in the **Configuration Settings** dialog box.

The **Options** button is disabled if no alternative values are available for the selected resource.

*NOTE: If you change one or more resource values using the **Options** button and later change the setting in the **Configuration Choice** box, the changes that you made to the resource values are overwritten by the default values for the new configuration choice.*

10. Click **OK** in the **Configuration Settings** dialog box when you have finished selecting resources for the function.

NOTE: After modifying the system configuration, you must turn off the system to install, remove, or change jumper settings on the non-Plug and Play ISA expansion cards to match the settings you selected in the ICU.

Adding an Unlisted Card

Unlisted cards are non-Plug and Play ISA expansion cards that do not have configuration files stored in the ICU database.

NOTE: If you want to add a configuration file that you received on diskette with a new expansion card, see "Adding a Listed Card" found earlier in this chapter.

To add an unlisted card with the ICU, perform the following steps:

1. Start the ICU as described in "Starting the ICU" found earlier in this chapter.

2. From the ICU window, click **Add** or select **Add Card** from the **Configure** menu.

3. Click the name of the category of card that you want to add. If you clicked **Add** in step 2, click **OK**.

   A dialog box appears, listing the names of all available cards of that type.

4. Select **Unlisted Card** from the bottom of the list of cards displayed in the dialog box that appears. Then click **OK**.

5. Click **No** when the ICU asks if you have a configuration file for the card.

   The **Configure Unlisted Card** dialog box appears with blank fields.

6. Enter the name of the card that you want to add in the **Card Name** field.

7. For each resource you want to assign to the card, click the box beneath the name of the resource to be assigned and then click **Add**.

   For example, if you click the box beneath IRQ, the button changes to **Add Interrupt**. When you click this button, a **Specify** dialog box (in this case, **Specify Interrupt**) appears. Figure 4-7 shows the **Configure Unlisted Card** dialog box with the **Specify Interrupt** dialog box opened.

Figure 4-7. Specify Interrupt Dialog Box

If you are providing a value for the IRQ or direct memory access (DMA) resource, click the down arrow beneath **Available Resources**. A smaller **Specify** list box appears (see Figure 4-8). Click the value you want to assign to the resource. Then click **OK**.

Figure 4-8. Specify Interrupt List Box

If none of the values for the DMA or IRQ resources match the allowable values for your unlisted card (as indicated in the card's documentation), select one of the available values offered by the utility and click **OK**.

If you are providing values for the input/output (I/O) port or memory resources, you must enter the starting and ending addresses in hexadecimal format using the two fields provided by the **Specify Memory** or **Specify I/O Port** dialog box. Click each box in succession to enter the beginning and ending addresses, and then click **OK** to complete the selection. Figure 4-9 shows the two fields.

Figure 4-9. Specify I/O Port Dialog Box

8. When you have finished selecting resources for the unlisted card, click **OK** in the **Configure Unlisted Card** dialog box.

    A message box appears, notifying you either that the card is using its default settings or that it cannot use its default settings and must be reconfigured.

9. Click **OK**. If the card must be reconfigured, record the resource settings recommended by the ICU. Click **Close** to accept the resource settings currently displayed.

10. If you had to assign a disallowed resource value to the card in steps 7, 8, and 9, click each of the other cards, and then click **View** until you find another card using a resource value that is allowed for the unlisted card. Reassign the resource setting for this other card using the procedure in the next section, "Modifying a Card." Then modify the resource settings for the unlisted card so that it uses an allowable value.

NOTE: After modifying the system configuration, you must turn the system off to install, remove, or change jumper settings on the non-Plug and Play ISA expansion cards to match the settings you selected in the ICU.

Modifying a Card

Modifying a card allows you to change the system resources used by a card. This feature is helpful when you want to add a card that requires resources already in use by other cards or devices in your computer. You can allocate different resources to the cards currently in your computer to free the resources necessary for the card you want to install.

You can also use this feature to force Plug and Play or PCI expansion cards to use specific resource values. This procedure is called *locking* a card. You should lock a card only if it uses static device drivers. See "Locking and Unlocking Cards" found later in this chapter for more information.

NOTE: You cannot modify the resources of a Plug and Play or PCI expansion card. You can only view the resources currently assigned and lock or unlock them.

To modify the resource settings for a listed or unlisted card, complete the following steps:

1. Start the ICU as described in "Starting the ICU" found earlier in this chapter.

2. Select the card from the list of installed cards in the ICU window, and choose **Modify Card** from the **Configure** menu or click **Modify**.

    If the **Card Configuration** dialog box appears, the selected card is listed (it has a configuration file in the ICU database). Continue with step 3.

    If the **Configure Unlisted Card** dialog box appears, the card is unlisted (it does not have a configuration file). Proceed to step 5.

NOTE: When you modify an unlisted card, the ICU cannot show you the valid resources for the card. Therefore, you must have documentation from the card manufacturer that describes the resources and resource settings that the card can use.

3. Follow steps 7 through 9 in "Adding a Listed Card" found earlier in this chapter. Then continue with step 4 of this procedure.

4. Click **OK** to complete the card modifications and return to the ICU window.

    You have completed this procedure; do not proceed to step 5.

5. To add, modify, or remove a resource value, select the box beneath the resource to be assigned, and then click **Add**, **Modify**, or **Remove**, respectively.

    For example, if you click the box beneath **IRQ**, the **Add**, **Modify**, and **Remove** buttons change to **Add Interrupt**, **Modify Interrupt**, and **Remove Interrupt**. When you click one of these buttons, a smaller **Specify** list box (in this case, **Specify Interrupt**) appears.

    If you are providing a value for the IRQ or DMA resource, click the down arrow beneath **Available Resources**. Click the value you want to assign to the resource. If the resource can be shared with another card or device, click **Sharable**. Then click **OK**.
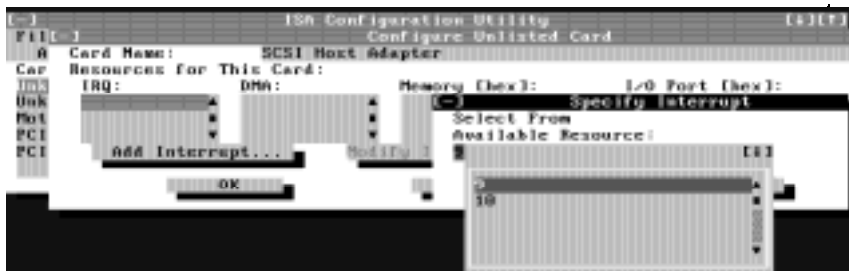
    If none of the values for the DMA or IRQ resource match the allowable values for your unlisted card (as indicated in the card's documentation), select one of the available values offered by the utility and click **OK**.

    If you are providing values for the I/O port or memory resource, you must enter the starting and ending addresses in hexadecimal format using the two fields provided by the **Specify Memory** or **Specify I/O Port** dialog box.
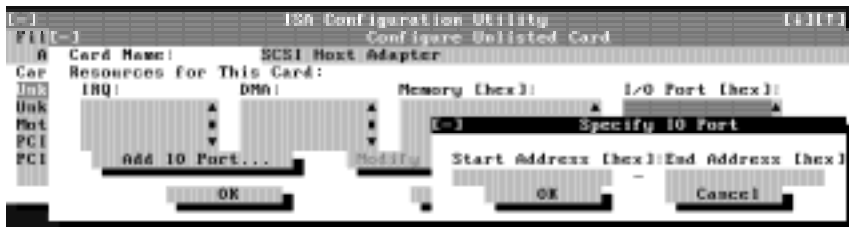
6. When you have finished selecting resources for the unlisted card, click **OK** in the **Configure Unlisted Card** dialog box.

    A message box appears, notifying you either that the card is using its default settings or that it cannot use its default settings and must be reconfigured.

7. Click **OK**. If the card must be reconfigured, record the resource settings recommended by the ICU. Click **Close** to accept the resource settings currently displayed.

8. If you had to assign a disallowed resource value to the card in steps 5, 6, and 7, click each of the other cards, and then click **View** until you find another card using a resource value that is allowed for the unlisted card. Reassign the resource setting for this other card. Then modify the resource settings for the unlisted card so that it uses an allowable value.

NOTE: After modifying the system configuration, you must turn off the system to install, remove, or change jumper settings on the non-Plug and Play ISA expansion cards to match the settings you selected in the ICU.

Removing a Card

Before you remove a non-Plug and Play ISA expansion card from your computer, you must use the ICU to remove the card from the system configuration.

NOTE: When you remove a Plug and Play or PCI expansion card from your computer, you do not need to run the ICU. To remove a Plug and Play or PCI expansion card, complete steps 2 through 8 in "Removing an Expansion Card" in Chapter 8.

Use the following procedure to remove a non-Plug and Play ISA expansion card from your computer:

1. Start the ICU as described in "Starting the ICU" found earlier in this chapter.

2. Select the card from the current system configuration list in the ICU window.

3. Select **Remove Card** from the **Configuration** menu, or click **Remove**.

   The ICU requests verification that you want to remove the card.

4. Click **Yes** to free the resources allocated to the card and remove the card's name from the list of active cards, or click **No** to cancel the operation.

   The ICU returns to the ICU window.

   CAUTION: After removing a card from the system configuration using the ICU, you must turn off the system and physically remove the card. Failure to do so can damage your system.

5. Remove the non-Plug and Play ISA expansion card from the computer.

   See "Removing an Expansion Card" in Chapter 8 for instructions.

Viewing Resources

The ICU displays all resources currently used by your system.

To view all system resources, select **System Resources** from the **View** menu or click **View**. The **System Resource Usage** dialog box (see Figure 4-10) displays all resources currently used by the system.

Figure 4-10. System Resource Usage Dialog Box

To determine which card uses a particular resource shown in the **System Resource Usage** dialog box, select the resource in question and then click **Used By Card**. The **Card Resource Usage** dialog box appears with the information.

To view the resources that a particular card is using, select the card from the list displayed in the ICU window, and then select **Card Resources** from the **View** menu or click **View**. The **Card Resource Usage** dialog box displays the resources assigned to that card. Figure 4-11 shows resources that might be assigned to a network adapter card.

Figure 4-11. Card Resource Usage Dialog Box

You can save the information displayed in the resource usage dialog box by clicking **Print To File**. The ICU then prompts you for a filename.

Saving the System Configuration

You can save the system configuration to nonvolatile random-access memory (NVRAM) as you configure each card's resources. To do so, select **Save** from the **File** menu and continue with your operation.

Exiting the ICU

At the ICU window, select **Exit** from the **File** menu to exit the utility. If you have made any changes to the system configuration, you are asked whether you want to save the changes.

If you click **Yes**, the ICU saves the updated system configuration information into NVRAM. If you click **No**, you exit the ICU without saving any of your configuration changes. If you click **Cancel**, nothing is saved and the utility continues to operate.

Locking and Unlocking Cards

The ICU includes a locking mechanism that enables you to allocate the system resources for all or for some functions of Plug and Play and PCI expansion cards. These expansion cards are *dynamic*, which means that they are allocated resources at system start-up. Device drivers that do not support this dynamic card configuration are referred to as *static device drivers*.

To determine whether your expansion card has static device drivers, check the documentation that came with the drivers. If you are using a static device driver, you need to permanently associate resources with a Plug and Play expansion card, instead of relying on the default Plug and Play behavior. Otherwise, the device driver might not be able to find the card the next time the system boots. This procedure is referred to as *locking* a card.

NOTE: The locking feature of the ICU is valid only for Plug and Play and PCI expansion cards.

Locking and Unlocking All Resources

To lock or unlock all the resources and configurations for a Plug and Play or PCI expansion card, perform the following steps:

1. If it is not already installed, install the Plug and Play or PCI expansion card. Then turn on the system.

    Complete steps 2 through 8 in "Installing an Expansion Card" in Chapter 8.

2. Start the ICU.

    See "Starting the ICU" found earlier in this chapter.

3. Select **Locking Enabled** from the **Advanced** menu in the ICU window.

    A check mark next to **Locking Enabled** signifies that the feature is active; a **Lock** button appears on the tool bar.

4. Select the Plug and Play or PCI expansion card that you want to lock or unlock from the **Cards Configured in System** list.

5. Click **Lock** or select **Lock/Unlock Card** from the **Advanced** menu.

    Both options toggle the lock state of the selected card.

Locking and Unlocking Configuration Resources

You can also lock and unlock individual resources for a Plug and Play or PCI expansion card. To do so, perform the following steps:

1. If it is not already installed, install the Plug and Play or PCI expansion card. Then turn on the system.

    Complete steps 2 through 8 in "Installing an Expansion Card" in Chapter 8.

2. Start the ICU.

    See "Starting the ICU" found earlier in this chapter.

3. Select **Locking Enabled** from the **Advanced** menu in the ICU window.

    A check mark next to **Locking Enabled** signifies that the feature is active; a **Lock** button appears on the tool bar.

4. Select the Plug and Play or PCI expansion card that you want to lock or unlock from the **Cards Configured in System** list.

5. Click **Modify** or select **Modify Card** from the **Configure** menu.

6. From the **Card Configuration** dialog box, select the function you want to lock or unlock.

7. Click **Settings**.

8. Modify the resource setting and/or resources offered on the **Configuration Settings** dialog box, if necessary.

   See "Modifying a Card" found earlier in this chapter for more information.

9. Select **Lock Resources**.

   The **Lock Resources** box toggles the lock state of the selected configuration setting.

10. Repeat steps 6 through 9 for any other configuration settings that you want to lock or unlock.

11. Click **OK** in the **Card Configuration** dialog box when you have finished making your selections.

C H A P T E R 5

Using the Network Interface Controller

This chapter describes how to connect your computer system to an Ethernet network using the integrated 3Com Peripheral Component Interconnect (PCI) 3C905b-TX network interface controller (NIC). The NIC provides all the functions normally provided by a separate network expansion card.

The integrated NIC includes a Wakeup On LAN feature that enables the computer to be started up by a special local area network (LAN) signal from a server management console. Wakeup On LAN capability allows remote computer setup, basic input/output system (BIOS) upgrades, software downloading and installation, file updates, and asset tracking after hours and on weekends when LAN traffic is typically at a minimum. For instructions on using this feature, see "Wakeup On LAN" in Chapter 3.

NOTES: The Wakeup On LAN feature functions even when the computer is turned off; however, the computer must be plugged into a working electrical outlet at all times and must be shut down in the normal method expected by the operating system. Thus, if you disconnect the system power cable from the electrical outlet, if a power failure occurs, or if you shut down the system abnormally, the Wakeup On LAN feature will not work.

When Wakeup On LAN is enabled in the System Setup program, the green link integrity indicator on the NIC connector (see Figure 5-1) remains on when the computer is turned off.

This chapter also provides instructions for configuring the NIC under the following operating systems:

- Microsoft Windows NT 4.0

- Microsoft Windows 95

- Microsoft Windows 98

NOTE: The NIC drivers for systems running a Dell-installed Windows NT 4.0, Windows 95, or Windows 98 operating system are automatically detected and installed. Instructions for reinstalling these NIC drivers are included later in this chapter.

The NIC connector on the computer's back panel (see Figure 5-1) has the following indicators:

- A yellow *activity indicator* flashes when the system is transmitting or receiving network data. (A high volume of network traffic may make this indicator appear to be in a steady "on" state.)

- A green *link integrity indicator* lights up when there is a good connection between the network and the NIC. When the green indicator is off, the computer is not detecting a physical connection to the network or the power source to the computer has been shut off.

link integrity indicator

activity indicator
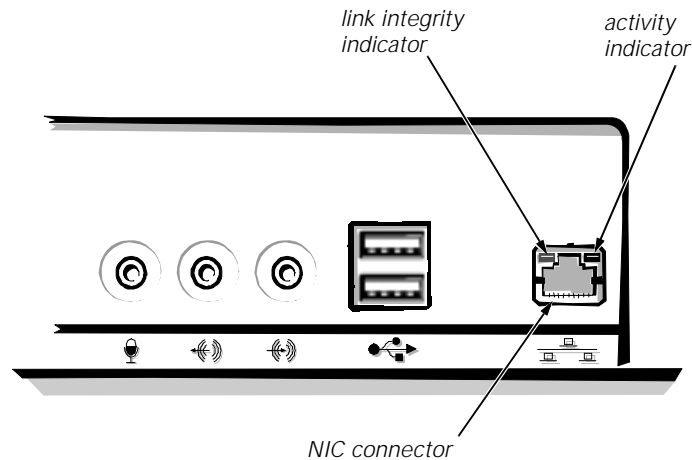
NIC connector

Figure 5-1. NIC Connector and Indicators

Connecting to a Network

To connect your system to and configure it for use on an Ethernet network, you must complete the following steps:

1. Connect the network cable to the back of your computer.

   See the following subsection, "Network Cable Requirements," for detailed instructions.

2. Verify that the NIC is enabled in the System Setup program.

   See "NIC" in Chapter 3 for instructions.

3. Configure the NIC and install the network driver.

   See "Configuring the NIC" found later in this chapter for detailed instructions.

4. Run the Network Interface Test Group in the Dell Diagnostics to verify that the NIC is operating properly.

   See the chapter titled "Running the Dell Diagnostics" in your *Diagnostics and Troubleshooting Guide* for detailed instructions.

Network Cable Requirements

Your computer's NIC connector (an RJ45 connector located on the back panel; see Figure 5-1) is designed for attaching an unshielded twisted pair (UTP) Ethernet cable. Press one end of the UTP cable into the NIC connector until the cable snaps securely into place.

Connect the other end of the cable to an RJ45 jack wall plate or to an RJ45 port on an Ethernet UTP concentrator or hub, depending on your network configuration. Observe the following cabling restrictions for 10BASE-T and 100BASE-TX networks:

- For 10-megabit (Mb) operation, use Category 3, 4, or 5 wiring and connectors. For 100-Mb operation, use Category 5 wiring and connectors. Voice and data lines should be in separate sheaths.

- The maximum cable run length (from a workstation to a concentrator) is 100 meters (m) (328 feet [(ft]).

- The maximum number of workstations (not counting concentrators) on a network is 1024.

- The maximum number of daisy-chained concentrators on one network segment is four.

Setting the Network Frame Type for Windows 95

This section describes how to set the network frame type for an Internetwork Packet eXchange/Sequenced Packet eXchange (IPX/SPX)-compatible network protocol.

If your system is connected to a network, follow these steps:

1. Right-click the **Network Neighborhood** icon on the Windows desktop, and click **Properties** in the pop-up menu.

2. Under the **Configuration** tab in the **Network** window, click **IPX/SPX-compatible Protocol** if it is not already selected.

3. Click **Properties** to open the **IPX/SPX-compatible Protocol Properties** window.

4. Click the **Advanced** tab, and then click **Frame Type** from the **Property** list.

5. Select the appropriate frame type (according to your network requirements) from the **Value** menu, and click **OK**.

6. Follow the instructions on your screen to complete the configuration.

Configuring the NIC

This section provides instructions for configuring the computer's integrated, 10/100-megabits-per-second (Mbps) 3Com NIC under the following operating systems:

- Microsoft Windows NT 4.0
- Microsoft Windows 95
- Microsoft Windows 98

NOTE: If you reinstall Windows NT 4.0, you must install Service Pack 3 and the bus-mastering EIDE device driver before you can install the NIC drivers.

Windows NT 4.0 NIC Driver

The Windows NT 4.0 operating system automatically detects and installs the NIC driver. To reinstall the driver, complete the following steps:

1. Use the Program Diskette Maker (located in the **Dell Accessories** program folder) to make a diskette copy of the NIC drivers installed on your hard-disk drive.

2. Connect the network cable to the back of your computer.

   See "Network Cable Requirements" found earlier in this chapter for detailed instructions.

3. Verify that the NIC is enabled in the System Setup program.

   See "NIC" in Chapter 3 for more information.

4. Start the Windows NT operating system, and log in as user Administrator or as a user with Administrator privileges.

   For information on administrative users and privileges, see your Windows NT documentation.

5. Double-click **My Computer**, double-click **Control Panel**, and then double-click the **Network** icon.

NOTE: If you are installing networking on your system for the first time, the Windows NT operating system displays a message asking if you want to install networking. Click **Yes***, and refer to your Windows NT documentation for instructions.*

6. Click the **Adapters** tab in the **Network Control Panel**, and then click **Add** to access the **Select Network Adapter** window.

7. Click **Have Disk**. Insert the NIC driver diskette 2 into drive A, type a:\, and then click **OK**.

   The **Select OEM Option** dialog box appears.

8. Select **3Com Fast EtherLink/EtherLink XL PCI Busmaster NIC (3C905B) for the 10/100-Mbps NIC**, and then click **OK**.

9. When prompted, remove the NIC driver diskette 2 from the diskette drive and insert the NIC driver diskette 1.

10. When the **Setup Message** confirms that the 3Com dRMON SmartAgent PC Software has been successfully installed, click **OK**.

   The operating system continues copying the appropriate driver files.

11. When the operating system has finished copying files from the NIC driver diskette 1, click **Close** in the **Windows Welcome** screen. Then click **Close** in the **Network** window.

12. If you are prompted to do so, enter information about your specific network.

   See your network administrator for information.

13. Click **Yes** in the **Network Settings Change** window to restart your system.

Windows 95 NIC Driver

The Windows 95 operating system automatically detects and installs the NIC driver. This subsection provides instructions for reinstalling the NIC driver on systems running a Dell-installed Windows 95 Service Release 2.1 operating system. Instructions for reinstalling the NIC driver on systems running a Windows 95 operating system not installed by Dell are also provided.

To determine your operating system version, click the **Start** button, point to **Settings**, and click the **Control Panel**. Double-click the **System** icon to access the **System Properties** window, and click the **General** tab. If your system version is 4.00.950 B, then the operating system is Dell-installed Windows 95 Service Release 2 or later. The system version is 4.00 for Windows 95 operating systems not installed by Dell.

NOTE: If you reinstall Windows 95, you must use either the Windows 95 operating system release version provided by Dell or its equivalent. Because of the advanced architecture of your Dell Precision 210 system, some components will not function correctly with Windows 95 versions earlier than Service Release 2.0 or 2.1.

Dell-Installed Windows 95 Service Release 2.1

To reinstall the NIC driver in a system running Dell-installed Windows 95 Service Release 2.1, perform the following steps:

1. Use the Program Diskette Maker (located in the **Dell Accessories** program folder) to make a diskette copy of the NIC drivers installed on your hard-disk drive.

2. Connect the network cable to the back of your computer.

   See "Network Cable Requirements" found earlier in this chapter for detailed instructions.

3. Verify that the integrated NIC is enabled and connected to its network.

   See "NIC" in Chapter 3 for more information.

4. Start the Windows 95 operating system.

5. Click the **Start** button, point to **Settings**, and click **Control Panel**. Then double-click the **System** icon.

6. In the **System Properties** window, click the **Device Manager** tab.

7. In the list of system devices, double-click **Unknown Devices**. Then click **PCI Ethernet Controller**.

8. Click **Properties** to access the **PCI Ethernet Controller** window.

9. Select the **Driver** tab, and then click **Update Driver**.

   The **Update Device Driver Wizard** starts.

10. Insert the NIC driver diskette 2 into drive A, and click **Yes (Recommended)**.

11. Click **Next** and then click **Finish** to access the **Insert Disk** dialog box.

12. Click **OK** to access the **Copying Files** dialog box. Type `a:\`, and then click **OK**.

   The Windows 95 operating system begins to copy files to the system's hard-disk drive.

13. Follow the instructions in the **Update Device Driver** window by inserting the NIC driver diskette 2 and continuing the installation procedure.

   As files are copied to the system's hard-disk drive, a pop-up window asks you to provide computer and workgroup names that will identify your computer on the network.

14. Click **OK**.

15. The **Network** dialog window appears. It contains tabs and text fields in which you must supply identifying information about your computer and network.

   Contact your network administrator for information.

16. When you have supplied the necessary computer and network identification information, click **Close** to exit the **Network** window.

17. If a pop-up window like the one in Figure 5-2 appears, click the check box beside the message `Device can be removed safely` and then click the **Test** button.
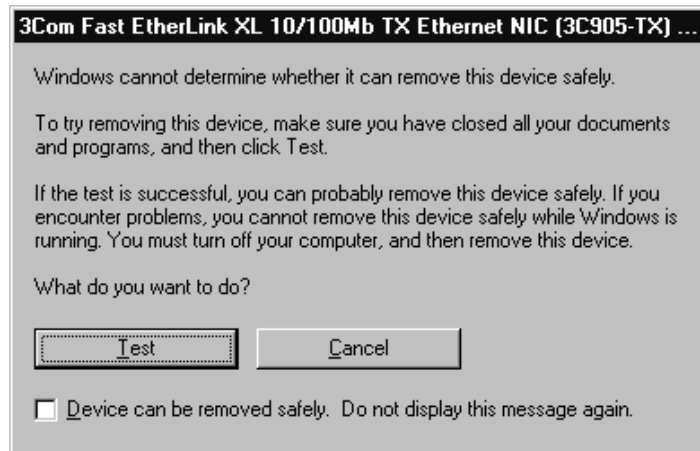
Figure 5-2. NIC Pop-up Window

18. When you are prompted for the location of additional files, specify the
   c:\windows\options\cabs directory on your hard-disk drive or the **\win95** direc-
   tory on your CD-ROM drive. Then click **OK** to access the **System Properties**
   dialog box.

   The Windows 95 operating system finishes copying all of the files to the sys-
   tem's hard-disk drive.

   NOTE: To make future updates easier, Dell recommends that the contents of the
   cabs *directory is on your hard-disk drive. You can copy the contents of*
   \win95\cabs *from the Windows 95 CD to a directory on your hard-disk drive*
   within the Windows directory; for example, **c:\windows\options\cabs***.*

19. When the **System Settings Change** dialog box appears, remove the diskette
   from drive A and click **Yes** to restart the system.

20. When the system restarts, the **Enter Network Password** dialog box appears.
   Enter the username and password you want to use for network access.

   See your Windows 95 documentation for information about usernames and
   passwords.

Windows 95 Operating Systems Not Installed by Dell

To reinstall the NIC driver in a system running a Windows 95 operating system not
installed by Dell, perform the following steps:

1. Use the Program Diskette Maker (located in the **Dell Accessories** program folder)
   to make a diskette copy of the NIC drivers installed on your hard-disk drive.

2. Connect the network cable to the back of your computer.

    See "Network Cable Requirements" found earlier in this chapter for detailed instructions.

3. Verify that the integrated NIC is enabled and connected to its network.

    See "NIC" in Chapter 3 for more information.

4. Start the Windows 95 operating system.

5. Click the **Start** button, point to **Settings**, and click the **Control Panel**. Then double-click the **System** icon.

6. In the **System Properties** window, click the **Device Manager** tab.

7. In the list of system devices, double-click **Unknown Devices**. Then click **PCI Ethernet Controller**.

8. Click **Properties** to access the **PCI Ethernet Controller** window.

9. Select the **Driver** tab, and then click **Change Driver** to access the **Select Hardware Type** dialog box.

10. Select **Network Adapter**, and then click **OK** to access the **Select Device** window.

11. Click **Have Disk** to access the **Install From Disk** dialog box.

12. Insert the NIC driver diskette 2 into drive A, and click **OK**.

    The system reads the files on the diskette and then displays the **Select Network Adapters** window.

13. Select **3Com Fast EtherLink XL 10/100Mb Ethernet Adapter**, and click **OK** to access the **PCI Ethernet Controller Properties** dialog box.

14. Click **OK** to access the **Network** dialog box. Enter your computer name and workgroup/domain. Then click **Close**.

15. Click **OK** in the **Insert Disk** dialog box.

16. When prompted for the location of additional files, insert the Windows 95 CD and specify the **\win95** directory on your CD-ROM drive. Then click **OK** to access the **System Properties** dialog box, and click **OK**.

17. Remove the diskette from drive A. Click the **Start** button, click **Shut Down**, and then click **Restart the Computer**.

18. Click **Yes** when prompted to restart the system.

Using the NDIS 2.01 Driver With Windows 95

To install the NDIS 2.01 NIC driver in systems running Dell-installed Windows 95 Service Release 2.1,or a Windows 95 operating system not installed by Dell, perform the following steps:

1. Install the Windows 95 NIC driver.

   See the appropriate instructions for your Windows 95 operating system found earlier in this chapter.

2. Start the Windows 95 operating system.

3. Click the **Start** button, point to **Settings**, and click **Control Panel**. Then double-click the **Network** icon.

4. In the **Network** window, click **3Com Fast EtherLink XL 10/100Mb TX Ethernet Adapter**, and then click **Properties**.

5. Select **Real Mode (16bit) NDIS driver**, and click **OK** to return to the **Network** window.

6. Click **OK**, and then click **Yes** to restart your system.

Using 3Com EtherDisk XL Version 3.01 Diskettes

The 3Com EtherDisk® XL version 3.01 diskettes provided by Dell are compatible with the 3C905 family of NICs. If you purchased a 3Com 3C905b-TX NIC separately, do not attempt to use the 3Com EtherDisk XL diskettes that came with the NIC. Use only the 3Com EtherDisk XL version 3.01 diskettes that were provided by Dell.

Windows 98 NIC Driver

If Dell installed the Windows 98 operating system on your computer, Windows 98 automatically detects and installs the NIC driver. This subsection describes how to reinstall the Windows 98 NIC driver under these two scenarios:

- You need to reinstall the NIC driver for a completely new Windows 98 installation.

- You need only to reinstall the NIC driver for an existing Windows 98 installation; for example, you need an updated driver or suspect that you need to replace a corrupted driver.

See the appropriate section for your situation.

Reinstalling the NIC Driver for a New Windows 98 Installation

Follow these steps to reinstall the NIC driver for a new Windows 98 installation:

1. Use the Program Diskette Maker (located in the **Dell Accessories** program folder) to make a diskette copy of the NIC drivers installed on your hard-disk drive.

2. Connect the network cable to the back of your computer.

    See "Network Cable Requirements" found earlier in this chapter for detailed instructions.

3. Verify that the integrated NIC is enabled and connected to its network.

    See "NIC" in Chapter 3 for more information.

4. Start the Windows 98 operating system.

5. Click the **Start** button, point to **Settings**, and click **Control Panel**. Then double-click the **System** icon.

6. In the **System Properties** window, click the **Device Manager** tab.

7. Click **Other Devices**.

8. Click **PCI Ethernet Controller**, and then click **Remove**. When prompted to remove the device, click **OK**.

9. In the **System Properties** window, click **Close**.

10. In the **Control Panel**, double-click **Network**.

11. Click any devices listed in the **Configuration** window, and then click **Remove**.

12. Click **Add**, click **Adapter** in the **Configuration** window, and then click **Add** again.

13. Insert the NIC driver diskette 2 into drive A.

14. In the **Select Network Adapters** window, click **Have Disk**.

15. In the **Install From Disk** window, enter a:\ under **Copy Manufacturer's Files From**, and then click **OK**.

16. In the **Select Network Adapter** window, click **3Com Fast Etherlink XL 10/100Mb TX Ethernet NIC (3C905B-TX)**, and then click **OK**.

    A notification pop-up window tells you that you have installed a Plug and Play adapter and that you must turn off the system and install the adapter. Your NIC is already integrated on the system board. Do not turn off the system at this time.

17. Click **OK** in the notification pop-up window.

18. At the empty **Network** window, click **OK**.

19. After the files have finished copying, close the **Control Panel**, click the **Start** button, and click **Shut Down**. When the **Shut Down Windows** dialog box appears, select **Shut Down the Computer?** and click **Yes**.

20. After the system turns off, remove the NIC driver diskette from drive A, wait 10 seconds, and then press the power button.

21. When the Windows 98 logo screen appears, reinsert NIC driver diskette 2 into drive A.

The system detects a PCI Ethernet controller.

22. At the **Add New Hardware Wizard** window, click **Next**.

23. When prompted to search for a driver, click **Next**.

24. When prompted for the location of the driver, click the **Specify a Location** check-box and verify that `c:\windows\options\cabs` is the search location. Then click **Next**.

25. When a message appears indicating that Windows 98 has found the best driver for the device, click **Next**.

26. When prompted to insert the NIC driver diskette, click **OK**.

27. At the **Copying Files** window, click the down arrow and click **a:**.Then click **OK**.

28. When a message appears telling you that Windows 98 has finished installing the software, click **Finish**.

29. When prompted to restart your computer, remove the NIC driver diskette from drive A and click **Yes**.

30. When the **Enter Network Password** dialog box appears, enter the user name and password you want to use for network access.

31. From the desktop, right-click the **Network Neighborhood** icon and click **Proper-ties**. Then configure the NIC properties as instructed by your network administrator.

NOTE: The IPX/SPX-compatible protocol is not loaded by default. It must be loaded manually.

32. When prompted to restart the system, click **Yes**.

Reinstalling the NIC Driver for an Existing Windows 98 Installation

Follow these steps to reinstall the NIC driver for an existing Windows 98 installation:

1. Use the Program Diskette Maker (located in the **Dell Accessories** program folder) to make a diskette copy of the NIC drivers installed on your hard-disk drive.

2. Remove the existing driver (if any) by right-clicking the **Network Neighborhood** icon and clicking **Properties**. Then click **Configuration**, select the existing driver, and click **Remove**. You should also remove the drivers for any other adapters listed as well.

3. Insert NIC driver diskette 2 into drive A.

4. In the **Configuration** window, click **Add**.

5. In the **Select Network Component Type** window, click **Adapter**, and then click **Add**.

6. In the **Select Network Adapters** window, click **Have Disk**.

7. In the **Install From Disk** window, enter `a:\` under **Copy Manufacturer's Files From**, and then click **OK**.

8. In the **Select Network Adapter** window, click **3Com Fast Etherlink XL 10/100Mb TX Ethernet NIC (3C905B-TX)**, and then click **OK**.

   A notification pop-up window tells you that you have installed a Plug and Play adapter and that you must turn off your system and install the adapter. Your NIC is already integrated on the system board. Do not turn off the system at this time.

9. Click **OK** in the notification pop-up window.

10. When prompted, insert the NIC driver diskette into drive A, and click **OK**.

11. At the **Copying Files** window, click the down arrow and click **a:**. Then click **OK**.

12. When prompted to restart your computer, remove the NIC driver diskette from drive A and click **Yes**.

13. When the **Enter Network Password** dialog box appears, enter the user name and password you want to use for network access.

14. When prompted to retain your previous network settings, click **Yes**.

15. At the **Add New Hardware Wizard** window, click **Next**.

16. When prompted to search for a driver, click **Next**.

17. When prompted for the location of the driver, click the **Specify a Location** checkbox and verify that `c:\windows\options\cabs` is the search location. Then click **Next**.

18. When a message appears indicating that Windows 98 has found the best driver for the device, click **Next**.

19. When prompted,insert the NIC driver diskette into drive A and click **OK**.

20. At the **Copying Files** window, click the down arrow and click **a:**. Then click **OK**.

21. When a message confirms that Windows has finished installing the software, click **Finish**.

22. When prompted to restart your computer, remove the NIC driver diskette 2 from drive A and click **Yes**.

23. When the **Enter Network Password** dialog box appears, enter the user name and password you want to use for network access.

24. From the desktop, right-click the **Network Neighborhood** icon and click **Properties**. Then configure the NIC properties as instructed by your network administrator.

   NOTE: The IPX/SPX-compatible protocol is not loaded by default. It must be loaded manually.

25. When prompted to restart the system, click **Yes**.

CHAPTER 6

Using the Integrated Audio Controller

This chapter describes how to connect your computer system to external audio devices that use the 16-bit integrated audio controller on your computer's system board.

The integrated Crystal 4237B controller is Sound Blaster Pro-compatible and supports the Microsoft Windows Sound System. The 4237B controller has a Sound Retrieval System (SRS) 3D stereo digital signal processing (DSP) engine that retrieves and restores spacial sound information, directional cues, and other sonic nuances that are typically missing or are altered by electronic reproduction of stereo sound.

This chapter also describes the audio application programs that Dell has installed on your hard-disk drive, and it tells you how to reinstall audio drivers if necessary.

NOTE: The instructions in this chapter apply to systems using the integrated audio controller. If you are using a sound card, use the connection instructions in the documentation that came with your sound card.

Connecting Audio Devices

You can connect a variety of audio devices to your computer. Use Figure 6-1 to locate the audio connectors on the input/output (I/O) panel on the back of your computer.

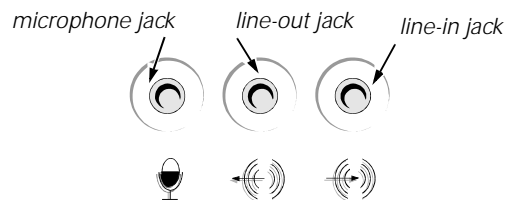microphone jack   line-out jack   line-in jack

Figure 6-1. Audio Connectors

Before using any audio device, be sure that **Sound** in the System Setup program is set to **On** (the default). For instructions, see Chapter 3, "Using the System Setup Program."

Speakers

Your computer system supports most standard speakers that have integrated amplifiers. You can purchase speakers separately from Dell.

Connect the audio cable from the speakers to the line-out jack (see Figure 6-1).

*NOTE: When speakers are attached to the line-out jack and **Sound** and **Speaker** in the System Setup program are set to **On**, sounds generated by the system and sounds generated by the integrated audio controller are heard through the external speakers and the computer's integrated speaker. If **Sound** in the System Setup program is set to **Off**, no sounds are emitted from any attached external speakers or from the integrated speaker, except for beep codes. If **Speaker** in the System Setup program is set to **Off**, the integrated speaker does not transmit sounds generated by the system (other than beep codes), but any attached external speakers do transmit these sounds. For more information, see "Sound" and "Speaker" in Chapter 3.*

Microphones

Your computer system supports most standard personal computer microphones. You can purchase a microphone separately from Dell.

Connect the audio cable from the microphone to the microphone jack (see Figure 6-1).

Record/Playback Devices

Your computer system supports a variety of record/playback devices such as cassette players, CD players, radios, stereo systems, video cassette recorders (VCRs), and tape players.

Connect the line-out cable from any one of these devices to the line-in jack on the back of your computer (see Figure 6-1).

CD-ROM Drives

To use an internal CD-ROM drive with the integrated audio controller, do the following:

1. Install the CD-ROM drive in your computer.

   For instructions on installing a CD-ROM drive that uses the computer's enhanced integrated drive electronics (EIDE) interface, see "Installing a Drive in a 5.25-Inch Drive Bay" in Chapter 9.

2. Connect the audio cable from the CD-ROM drive to the CD-ROM drive audio interface connector (labeled "CD-IN") on the system board.

   See Figure 8-1 for the location of the CD-IN connector on the system board.

NOTES: The integrated audio controller allows you to manipulate musical instrument digital interface (MIDI) files on your computer and to hear output from those files on external speakers. However, to communicate with an external MIDI device, such as a

synthesizer or other musical instrument, you must install a MIDI-compatible expansion card. (For instructions, see "Installing an Expansion Card" in Chapter 8.) If you use a MIDI card, set **Sound** *in the System Setup program to* **Off**. *(See Chapter 3, "Using the System Setup Program," for information on changing System Setup settings.)*

To use a joystick, install a joystick-compatible expansion card in your computer. (For instructions, see "Installing an Expansion Card" in Chapter 8.) If you use a joystick card with sound capabilities, set **Sound** *in the System Setup program to* **Off**. *(See Chapter 3, "Using the System Setup Program," for information on changing System Setup settings.)*

Adjusting Volume

Use the instructions in one of the following subsections to adjust the speaker balance and volume of an audio source that uses the integrated audio controller in your Dell computer.

Adjusting Volume in Windows 95

Use the following procedure to adjust the speaker or headphone volume in the Windows 95 operating system:

1. Click the **Start** button, point to **Settings**, and click **Control Panel**.

2. Double-click the **Multimedia** icon.

3. Click the **Audio** tab, and move the slide switch for playback or recording to the desired volume.

For detailed instructions on adjusting the volume, see your Windows 95 documentation.

Adjusting Volume in Windows 98

Use the following procedure to adjust the speaker or headphone volume in the Windows 98 operating system:

1. Click the **Start** button, point to **Settings**, and click **Control Panel**.

2. Double-click the **Multimedia** icon.

3. Click the **Audio** tab, and move the slide switch for playback or recording to the desired volume.

    a. Click the **Playback** icon, move the slide switches for playback to the desired volume, and then click **OK**.

    b. Click the **Record** icon, move the slide switches for record to the desired volume, and then click **OK**.

For detailed instructions on adjusting the volume, see your Windows 98 documentation.

Adjusting Volume in Windows NT 4.0

Use the following procedure to adjust the speaker or headphone volume in the Windows NT 4.0 operating system:

1. Start the **Audio Mixer** utility located in the **Audio Control** program folder.

2. Adjust the slide controls labeled "Master" to adjust the volume and balance for all devices, or adjust the slide controls for an individual device.

For detailed instructions on adjusting the volume, see your Windows NT documentation.

Muting the Internal Speaker

To mute the internal speaker, follow these steps:

1. Start the Windows 95, Windows 98, or Windows NT operating system.

2. Double-click the speaker icon in the right corner of the taskbar.

3. From the **Master Out** panel, click **Advanced Controls** in the **Options** menu.

4. Click the **Advanced** button under the **Master Out** column.

5. Click the **PC Speaker Mute** check box.

Adjusting 3D Sound

The 4237B 3D sound system contains two controls—a space control and a center control—for adjusting the spatial effect of sound played through speakers connected to your computer. Turning up the level of the space control increases the amount of corrected directional information, restores the proper localization of the original sounds, and expands the width of the overall sound stage. Turning down the level of the space control decreases these effects. Always adjust the space control before adjusting the center control. Turning up the center control emphasizes centered sounds (typically vocals, solo instruments, bass, and kick drums in a musical recording) so that their intensity appears increased and they are brought into the center of the room.

To adjust the space and center controls, follow these steps:

1. Start the Windows 95, Windows 98, or Windows NT operating system.

2. Click right on the blue circle icon in the lower-right corner of the taskbar.

3. Click the **Enabled** check box in the control panel that appears.

4. Slide the Space and Center control slide switches until you achieve the desired effect.

Using Audio Utilities

The operating system installed on your Dell system has its own utilities for playing audio CDs and manipulating **.wav** files:

- For Windows 95, use Media Player under **Multimedia** in the **Accessories** program folder.

- For Windows 98, use Media Player under **Entertainment** in the **Accessories** program folder.

- For Windows NT 4.0, use Audio Input to control the input of devices from which you are recording **.wav** data. Use Audio Mixer to adjust sound levels from several different audio sources.

Installing Audio Drivers

Your system's audio drivers were installed at Dell and are operative when you receive the system—no further installation or configuration is needed. The following subsections provide instructions on reinstalling these drivers if necessary.

Audio Drivers for Windows 95

To reinstall the audio drivers for Windows 95, you must first remove the old drivers and then install the new drivers. Follow these steps:

1. Use the Program Diskette Maker (located in the **Dell Accessories** folder) to make a diskette copy of the audio drivers installed on your hard-disk drive.

2. Start the Windows 95 operating system.

3. Insert the Windows 95 audio drivers diskette into drive A.

4. Click the **Start** button and click **Run**. Type `a:\setup` in the dialog box and click **OK**.

5. When the **Crystal Driver Uninstall Complete** window appears, remove the audio drivers diskette from drive A and click **Restart**.

6. After Windows 95 restarts, insert the audio drivers diskette into drive A and click **Next** at the **Update Driver Wizard** window.

   The system finds the following driver:

   `Crystal PnP Audio System CODEC`

7. Click **Finish**.

8. At the **Insert Disk** window, verify that the audio drivers diskette is in drive A and click **OK**.

9. At the copying files window, type `a:\` and click **OK**.

   The audio driver files are copied to your system and you are returned to Windows 95.

Audio Drivers for Windows 98

To reinstall the audio drivers for Windows 98, you must first remove the old drivers and then install the new drivers. Follow these steps:

1. Use the Program Diskette Maker (located in the **Dell Accessories** folder) to make a diskette copy of the audio drivers installed on your hard-disk drive.

2. Start the Windows 98 operating system.

3. Insert the Windows 98 audio drivers diskette into drive A.

4. Click the **Start** button and click **Run**. Type a:\setup in the dialog box and click **OK**.

5. When the **Crystal Semiconductor** window appears, click **Install Driver**.

   The drivers are installed and a message appears prompting you to restart the system.

6. Remove the audio drivers diskette from drive A, and click **Restart**.

7. After Windows 98 restarts, insert the audio drivers diskette into drive A and click **Next** at the **Add New Hardware Wizard** window.

   The system finds the following driver:

   ```
   Crystal PnP Audio System CODEC
   ```

8. Click **Next**.

9. Click **Floppy Disk Drives** to put a check mark in the box.

10. Click **Next**.

11. Click **Updated Driver (Recommended)** to put a check mark in the box.

12. Click **Next**, and click **Next** again.

13. Click **Finish**.

   The audio driver files are copied to your system and you are returned to Windows 98.

Audio Drivers for Windows NT 4.0

To reinstall the audio drivers for Windows NT 4.0, follow these steps:

1. Use the Program Diskette Maker (located in the **Dell Accessories** folder) to make a diskette copy of the audio drivers installed on your hard-disk drive.

2. Start the Windows NT 4.0 operating system.

3. Insert the Windows NT 4.0 audio drivers diskette into drive A.

4. Click the **Start** button, point to **Settings**, and click **Control Panel**.

5. Double-click the **Multimedia** icon.

6. In the **Multimedia Properties** window, click the **Devices** tab and then click **Add**.

7. In the **Add** dialog box, select **Unlisted** or **Updated Driver** and click **OK**.

8. In the **Install Driver** dialog box, type **a:** and click **OK**.

9. In the **Add Unlisted** or **Updated Driver** dialog box, select **CrystalWare Audio Driver NT** and click **OK**.

After the drivers have been installed, there will be a new **Audio Control** program folder with two programs—Audio Mixer and Audio Input.

CHAPTER 7
Working Inside Your Computer

Your Dell Precision 210 system supports a variety of internal options that expand system capabilities. This chapter prepares you to install options inside the computer. It describes how to remove and replace the computer cover and rotate the power supply away from the system board. It also familiarizes you with the internal components you may handle if you install Dell hardware options.

Before You Begin

To make working inside your computer easier, make sure you have adequate lighting and a clean work space. If you temporarily disconnect cables or remove expansion cards, note the position of the connectors and slots so that you can reassemble the system correctly.

You will use the information in this section every time you install a hardware option inside your computer. *Read this section carefully*, because the information is not repeated in detail elsewhere in this guide.

Safety First—For You and Your Computer

Working inside your computer is safe—if you observe the following precautions.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF YOUR EQUIPMENT

Before starting to work on your computer, perform the following steps in the sequence indicated:

1. **Turn off your computer and all peripherals.**

2. **Disconnect your computer and peripherals from their AC power sources. Also, disconnect any telephone or telecommunication lines from the computer. Doing so reduces the potential for personal injury or shock.**

3. **If you are disconnecting a peripheral from the computer or are removing a component from the system board, wait 10 to 20 seconds after disconnecting the computer from AC power before disconnecting the peripheral or removing the component to avoid possible damage to the system board.**

   To verify that all power has been removed from the system, make sure that the standby light-emitting diode (LED) on the system board has gone out. For the location of this LED, see Figure 9-1.

4. **Touch an unpainted metal surface on the computer chassis, such as the power supply, before touching anything inside your computer.**

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components. Also avoid touching components or contacts on a card and avoid touching pins on a chip.

In addition, Dell recommends that you periodically review the safety instructions at the front of this guide.

Unpacking Your Hardware Option

When you remove an option from its shipping carton, you may find it wrapped in anti-static packing material designed to protect it from electrostatic damage. Do not remove the packing material until you are ready to install the option.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

Removing the Computer Cover

Use the following procedure to remove the computer cover:

1. Turn off your computer and peripherals, and make sure you unplug the computer from its electrical outlet before you remove the computer cover. Observe the *Warning for Your Personal Safety and Protection of Your Equipment* described earlier in this chapter. Also observe the safety instructions at the front of this guide.

2. If you have installed a padlock through the padlock ring on the back panel (see Figure 7-1), remove the padlock.
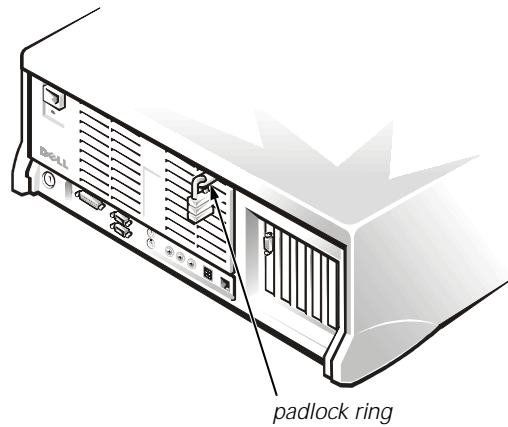
padlock ring

Figure 7-1. Padlock Installed

3. Remove the cover.

    From the front of the computer, press in the two securing buttons (located on the sides of the cover toward the back). With the buttons depressed, lift the cover at the back, allowing it to pivot up toward you (see Figure 7-2).

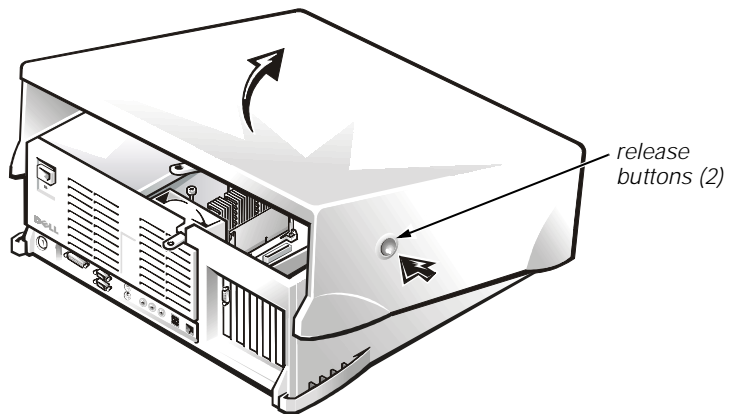   Disengage the plastic hooks that secure the cover to the front of the chassis, and lift the cover away.

release buttons (2)

Figure 7-2. Removing the Computer Cover

Replacing the Computer Cover

Use the following procedure to replace the computer cover:

1. Check all cable connections, especially those that might have come loose during your work. Fold cables out of the way so that they do not catch on the computer cover. Make sure cables are not routed over the drive cage—they will prevent the cover from closing properly.

2. Check to see that no tools or extra parts (including screws) are left inside the computer's chassis.

3. Replace the cover.

    Facing the left side of the computer, hold the cover at a slight angle as shown in Figure 7-3. Fit the three cover hooks into the rectangular slots on the chassis. (It might be helpful to look down into the chassis to verify that the hooks are in place.)

    Pivot the cover down toward the back and into position. Make sure that the two securing buttons click into place.

    NOTE: The computer should be placed fully on a flat surface. It is difficult to align the cover if the front of the computer is hanging over the edge of a table.
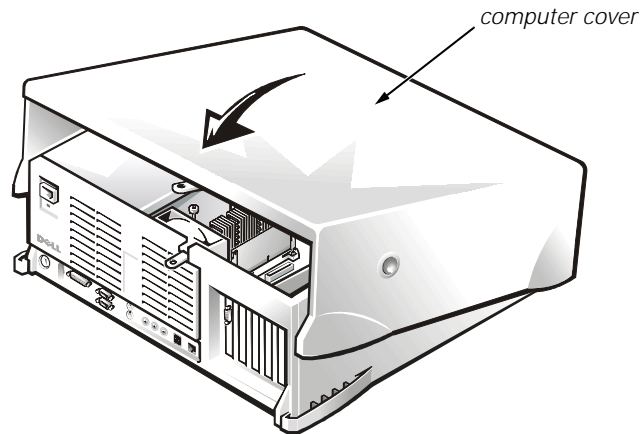
computer cover

Figure 7-3. Replacing the Computer Cover

4. If you are using a padlock to secure your system, reinstall the padlock.

    NOTE: After removing and replacing the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

    `ALERT! Cover was previously removed.`

5. Reset the chassis intrusion detector by entering the System Setup program and setting **Chassis Intrusion** to **Not Detected**.

See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Inside Your Computer

Figure 7-4 shows a top view of your computer to help you orient yourself when installing hardware options. Unless otherwise specified, locations or directions relative to the computer are as shown.
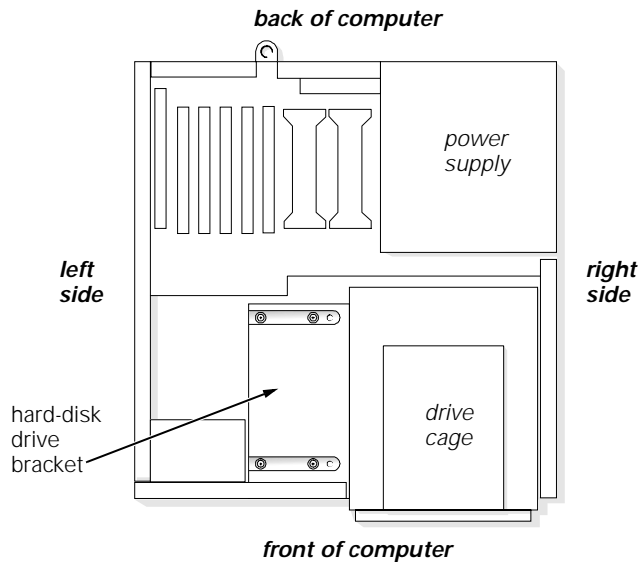
Figure 7-4. Computer Orientation View

Figure 7-5 shows your computer with its cover removed. Refer to this illustration to locate interior features and components discussed in this guide.
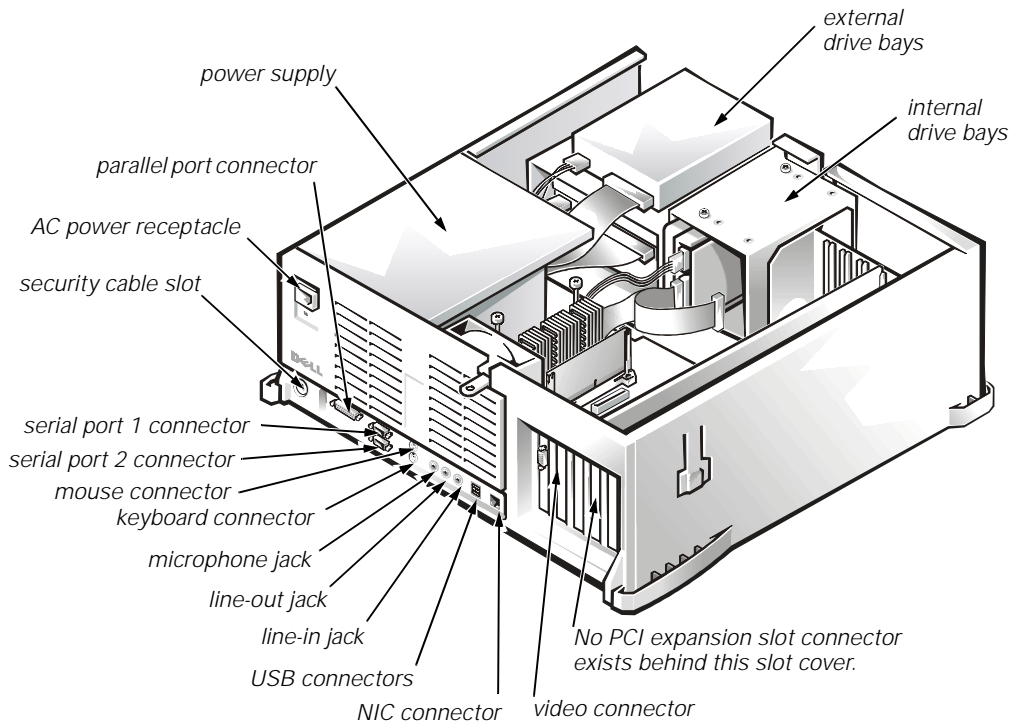
Figure 7-5. Inside the Chassis

Rotating the Power Supply Away From the System Board

To access some components on the system board, you may have to rotate the system power supply out of the way. Use the following procedure to rotate the power supply:

1. Remove the computer cover as instructed in "Removing the Computer Cover" found earlier in this chapter.

2. Disconnect the AC power cable from the AC power receptacle on the back of the power supply (see Figure 7-6).
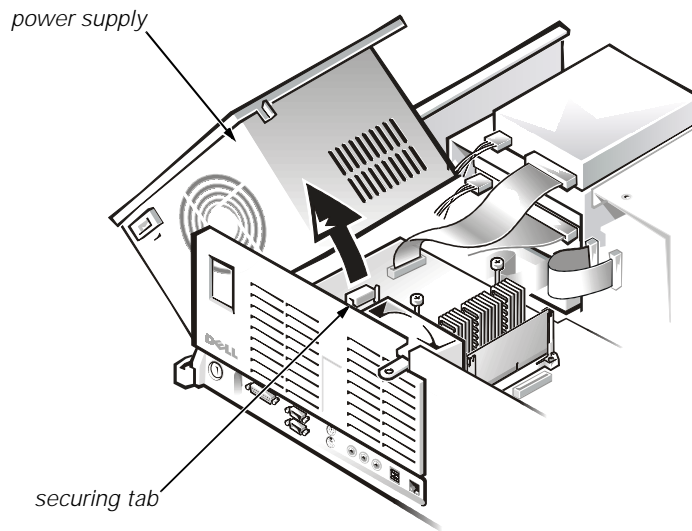
Figure 7-6. Rotating the Power Supply

3. Free the power supply by pressing the securing tab labeled "RELEASE —>," and then rotate the power supply upward to a vertical position.

C H A P T E R 8

Installing System Board Options

This chapter describes how to install the following options:

- Peripheral Component Interconnect (PCI), accelerated graphics port (AGP), and Industry-Standard Architecture (ISA) expansion cards
- System memory
- Microprocessor single-edge contact (SEC) cartridge

This chapter also includes instructions for replacing the system battery, if necessary.

Use Figure 8-1 to locate the system board features.

CD-ROM drive audio interface connector (CD-IN)

main power input connector (POWER1)

parallel port connector (PARALLEL)

battery socket (BATTERY)

serial port connectors (SERIAL 1/2) (stacked)

diskette-drive interface connector (DISKETTE) (pin-1 corner)

microprocessor fan connector (FAN)

mouse/keyboard connectors (MOUSE/KYBD) (stacked)

DIMM sockets (DIMM_A–DIMM_D)

microphone jack (MIC-IN)

front of computer

line-out jack (LINE-OUT

line-in jack (LINE-IN)

primary EIDE interface connector (IDE1) (pin-1 corner)

USB connectors (USB)

control panel connector (PANEL)

NIC connector (ENET)

primary SEC cartridge connector (SLOT1_PRI)

secondary EIDE interface connector (IDE2) (pin-1 corner)

secondary SEC cartridge connector (SLOT1_SEC)

configuration jumpers

AGP expansion-card connector (AGP)

standby LED

power LED

PCI expansion-card connectors (PCI1-PCI3)

ISA expansion-card connector (ISA1)
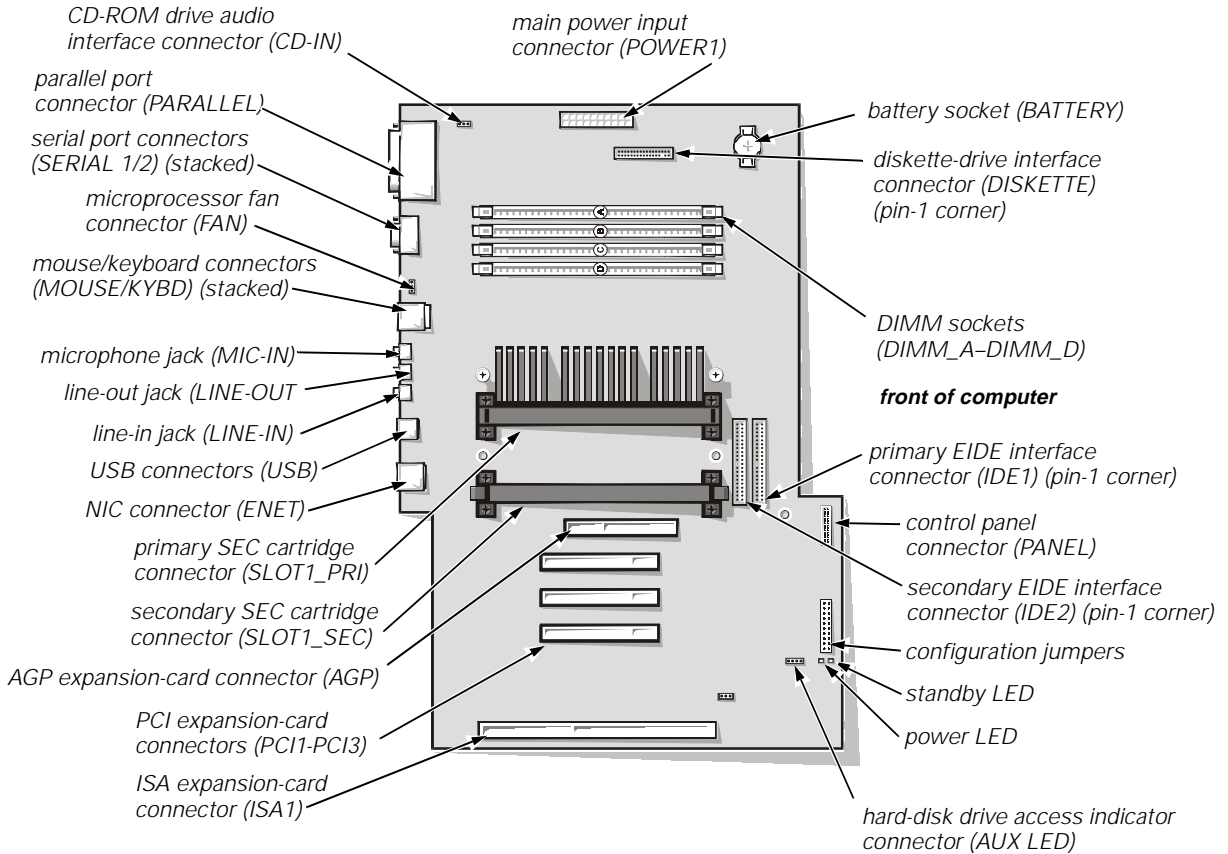
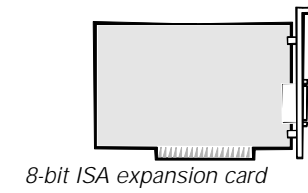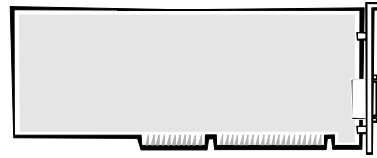hard-disk drive access indicator connector (AUX LED)

Figure 8-1. System Board Features

Expansion Cards

The system accommodates up to six expansion cards, including 32-bit PCI expansion cards, an 8- or 16-bit ISA expansion card, and a 32-bit AGP card. (See Figure 8-2 for examples of these cards.)

8-bit ISA expansion card

16-bit ISA expansion card
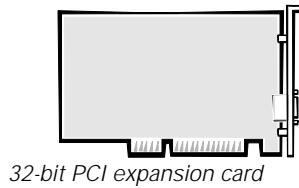
32-bit PCI expansion card
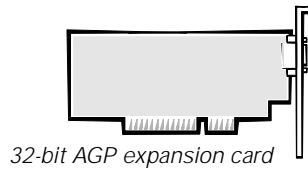
32-bit AGP expansion card

Figure 8-2. Expansion Cards

Expansion Slots

There are five expansion-card connectors on the system board. Expansion-card con-
nectors PCI1 through PCI3 support 32-bit PCI expansion cards; expansion-card
connector AGP supports a 32-bit AGP expansion card; and expansion-card connector
ISA1 can accommodate an 8- or 16-bit ISA expansion card.

*NOTES: Connector ISA1 shares expansion-slot space with connector PCI3. Therefore,
only one card of either type can be installed in this slot.*

Installing an Expansion Card

Follow this general procedure to install an expansion card:

1. If you are installing a non-Plug and Play ISA expansion card, enter the ISA Configuration Utility (ICU) and add the new expansion card to your configuration.

    See Chapter 4, "Using the ISA Configuration Utility," for instructions.

    NOTE: If you install a PCI or Plug and Play expansion card, your system automatically performs any required configuration tasks during the boot routine.

2. Prepare the expansion card for installation, and remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 7.

    CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

    See the documentation that came with the expansion card for information on configuring the card, making internal connections, or otherwise customizing it for your system.

    CAUTION: Some network cards automatically start up the system when they are connected. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any expansion cards.

3. Unscrew and remove the metal filler bracket that covers the card-slot opening for the expansion slot you intend to use (see Figure 8-3).

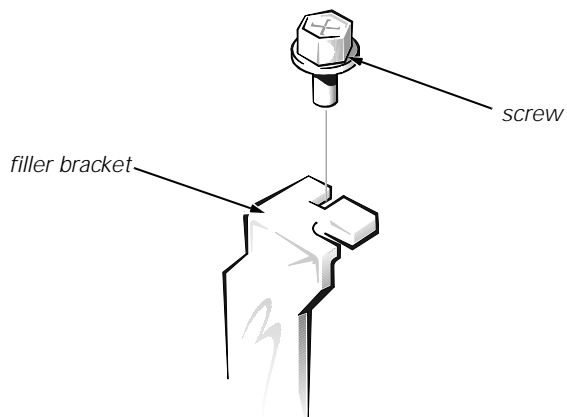   Save the screw to use when installing the expansion card later in this procedure.

screw

filler bracket

Figure 8-3. Removing the Filler Bracket

4. Insert the expansion card into the expansion-card connector.

   If the expansion card is full-length, insert the front end of the card into the corresponding card guide on the inside front of the chassis as you insert the card into its connector.

   Insert the card's edge connector firmly into the expansion-card slot. Gently rock the card into the connector until it is fully seated (see Figure 8-4).
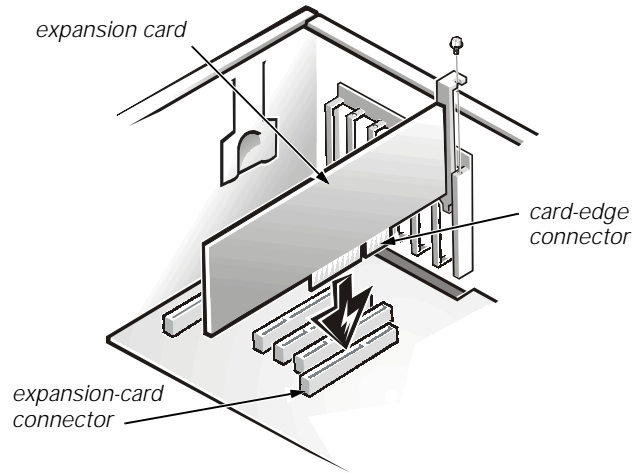

expansion card

card-edge
connector

expansion-card
connector

Figure 8-4. Installing an Expansion Card

5. When the card is firmly seated in the connector, secure the card's mounting bracket to the chassis with the screw you removed in step 3.

6. Connect any cables that should be attached to the card.

   See the documentation that came with the card for information about the card's cable connections.

7. Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.

   NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

   `ALERT! Cover was previously removed.`

8. To reset the chassis intrusion detector, enter the System Setup program and reset **Chassis Intrusion** to **Not Detected**.

   See Chapter 3, "Using the System Setup Program," for instructions.

   NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Removing an Expansion Card

Follow this general procedure to remove an expansion card:

1. If you are removing a non-Plug and Play ISA expansion card, enter the ICU and remove the expansion card from your configuration.

    See Chapter 4, "Using the ISA Configuration Utility," for instructions.

2. Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 7.

    CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. If necessary, disconnect any cables connected to the card.

4. Unscrew the mounting bracket of the card you want to remove.

5. Grasp the card by its outside corners, and ease it out of its connector.

6. If you are removing the card permanently, install a metal filler bracket over the empty card-slot opening.

    NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of your computer.

7. Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.

    NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

    `ALERT! Cover was previously removed.`

8. To reset the chassis intrusion detector, enter the System Setup program and reset **Chassis Intrusion** to **Not Detected**.

    See Chapter 3, "Using the System Setup Program," for instructions.

    NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Adding Memory

Dell Precision 210 systems can use unbuffered synchronous dynamic random-access memory (SDRAM) modules that provide error checking and correction (ECC) capabilities.

System memory can be increased up to 512 megabytes (MB) using unbuffered SDRAM dual in-line memory modules (DIMMs) (see Table 8-1).

Figure 8-5 shows the DIMMs and DIMM sockets.
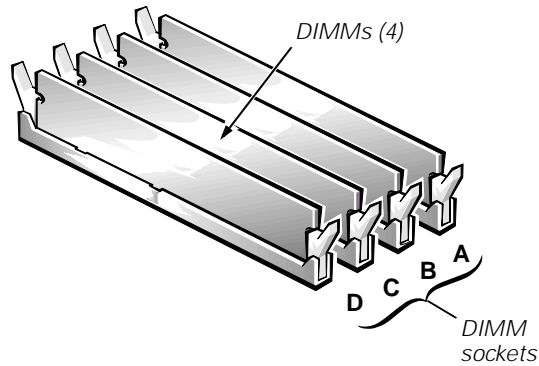
Figure 8-5. DIMMs and DIMM Sockets

DIMM Installation Guidelines

When adding system memory, you may install DIMMs in any order. For optimum operation, Dell recommends installing the DIMMs starting with socket A (closest to the top edge of the system board) and working toward socket D, leaving no open sockets between installed DIMMs.

Table 8-1 lists sample memory configurations.

Table 8-1. Sample Unbuffered SDRAM DIMM Configuration Options

Total Desired Memory	DIMM Socket			
	A	B	C	D
64 MB	32 MB	32 MB		
64 MB	64 MB			
96 MB	32 MB	32 MB	32 MB	
128 MB	32 MB	32 MB	32 MB	32 MB
192 MB	64 MB	64 MB	32 MB	32 MB

Table 8-1. Sample Unbuffered SDRAM DIMM Configuration Options *(continued)*

Total Desired Memory	DIMM Socket			
	A	**B**	**C**	**D**
256 MB	128 MB	128 MB		
384 MB	64 MB	64 MB	128 MB	128 MB
512 MB	128 MB	128 MB	128 MB	128 MB

Follow this procedure to perform a memory upgrade:

1. Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 7.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

2. To access the DIMM sockets on the system board, rotate the power supply as described in "Rotating the Power Supply Away From the System Board" in Chapter 7.

3. Determine the DIMM sockets in which you will install DIMMs or replace existing DIMMs.

4. Install or replace DIMMs as necessary to reach the desired memory total.

   Follow the instructions in "Installing a DIMM" or "Removing a DIMM," as appropriate, found later in this section.

5. Rotate the power supply back into position, making sure the securing tab snaps into place.

6. Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.

   NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

   ```
   ALERT! Cover was previously removed.
   ```

   The system detects that the new memory does not match the existing system configuration information and generates the following message:

   ```
   The amount of system memory has changed.
   Strike the F1 key to continue, F2 to run the setup utility
   ```

7. Press <F2> to enter the System Setup program, and check the value for **System Memory** in the lower-right corner of Page 1.

The system should have already changed the value of **System Memory** to reflect the newly installed memory. Verify the new total.

NOTE: If the memory total is incorrect, turn off and disconnect your computer and peripherals from their power sources. Remove the computer cover, rotate the power supply, and check the installed DIMMs to make sure that they are seated properly in their sockets. Then repeat steps 5, 6, and 7.

8. While in the System Setup program, reset the chassis intrusion detector by changing **Chassis Intrusion** to **Not Detected**.

See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

9. When the **System Memory** total is correct, press the <Esc> key to exit the System Setup program.

10. Run the Dell Diagnostics to verify that the DIMMs are operating properly.

See your *Diagnostics and Troubleshooting Guide* for information on running the diagnostics and troubleshooting any problems that may occur.

Installing a DIMM

If a DIMM is already installed in the socket you want to use, you must remove it. To do so, follow the instructions in the next subsection, "Removing a DIMM."

Use the following procedure to install a DIMM (see Figure 8-6):

1. Locate the plastic securing clips at each end of the socket. Press the clips outward until they snap open.

2. Press the DIMM straight into the slot running down the center of the socket until the securing tabs snap into place around the ends of the DIMM.
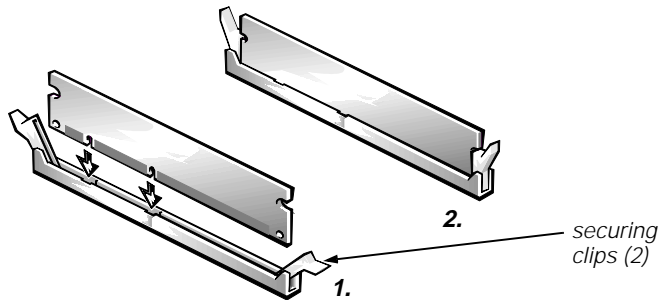

2.

securing clips (2)

1.

Figure 8-6. Installing a DIMM

Removing a DIMM

To remove a DIMM, press the securing clips outward simultaneously until the DIMM disengages from the socket (see Figure 8-7). It should pop out slightly.
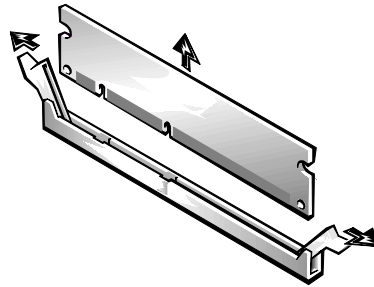

Figure 8-7. Removing a DIMM

Microprocessor Upgrades

To take advantage of future options in speed and functionality, you can add a second processor or replace either the primary or secondary processor.

CAUTION: The second processor must be of the same type and speed as the first processor.

Each processor and its associated level-2 (L2) cache memory are contained in an SEC cartridge that is installed in a dedicated connector on the system board. In systems with only one processor, a terminator card is installed in the secondary processor connector. The following subsection describes how to install or replace an SEC cartridge in either the primary or secondary processor connector.

Adding or Replacing a Microprocessor

The following items are included in a microprocessor upgrade kit:

- The new microprocessor SEC cartridge with attached heat sink
- Two heat-sink securing thumbscrews

Use the following procedure to add or replace an SEC cartridge.

NOTE: Dell recommends that only a technically knowledgeable person perform this procedure.

1. Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 7.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

2. Rotate the power supply as described in "Rotating the Power Supply Away From the System Board" in Chapter 7.

WARNING: The microprocessor SEC cartridge/heat sink assembly can get extremely hot. Be sure that the assembly has had sufficient time to cool before you touch it.

3. If you are adding a second processor to a single-processor system, remove the terminator card from the secondary SEC cartridge connector (labeled "SLOT1_SEC").

   Press the SEC cartridge release latches inward until they snap into position. Pull the terminator card straight out to remove it from the connector.

4. If you are replacing an installed processor, remove the current SEC cartridge/heat sink assembly from its connector.

   Unscrew and remove the two large thumbscrews that secure the heat sink to the system board. Press the SEC cartridge release latches inward until they snap into position. Grasp the SEC cartridge assembly firmly, and pull it away from the guide bracket assembly (see Figure 8-8). You must use up to 15 pounds (lb) of force to disengage the SEC cartridge from the connector.
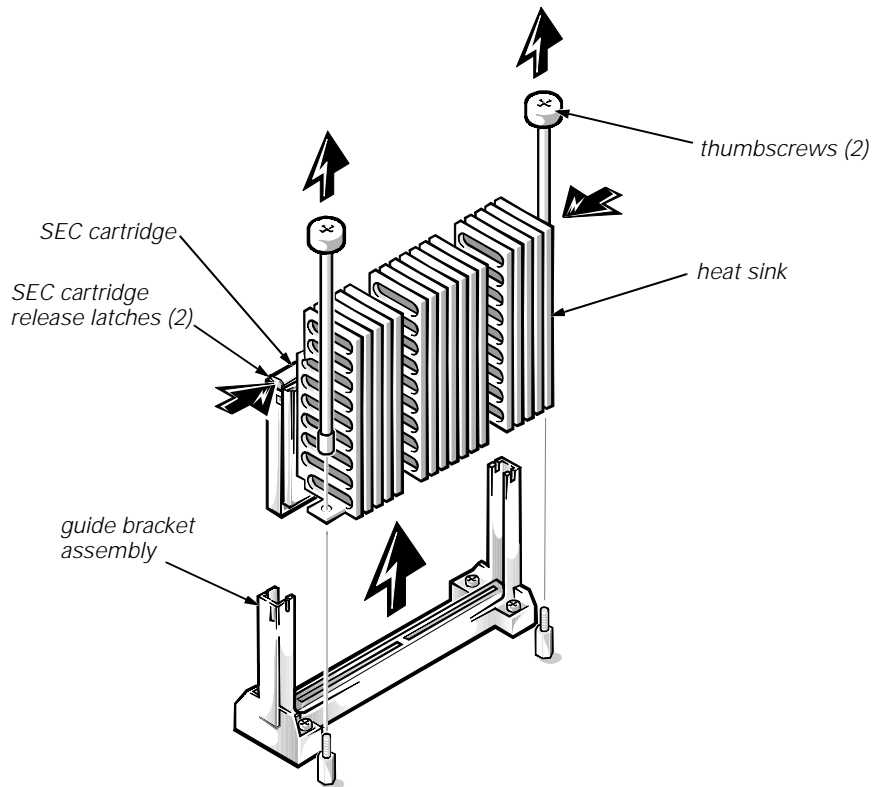

Figure 8-8. SEC Cartridge/Heat Sink Assembly Removal

5. Insert the new SEC cartridge/heat sink assembly into the system board connector.

    Press the SEC cartridge firmly into its connector until it is fully seated and the latches snap into place. You must use up to 25 lb of force to fully seat the SEC cartridge in its connector. Install or replace the two large thumbscrews that secure the heat sink to the system board.

6. If necessary, change the processor speed jumper setting (see Figure B-1 to locate system board jumpers).

    The processor speed jumper should be set for the installed microprocessor's rated internal speed. For example, for a 350-megahertz (MHz) Intel Pentium II processor, a jumper plug should be installed on the pins labeled "350MHZ." (See Appendix B, "Hardware Configuration Features," for more information on the jumpers.)

7. Rotate the power supply back into position, making sure that the securing tab snaps into place.

8. Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.

    As the system boots, it detects the presence of the new processor and automatically changes the system configuration information in the System Setup program.

    NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

    `ALERT! Cover was previously removed.`

9. Enter the System Setup program, and confirm that the system data area correctly identifies the type and number of installed processor(s).

    See Chapter 3, "Using the System Setup Program."

10. While in the System Setup program, reset the chassis intrusion detector by changing **Chassis Intrusion** to **Not Detected**.

    See Chapter 3, "Using the System Setup Program," for instructions.

    NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

11. If you installed a second microprocessor and your system is running Windows NT 4.0, reinstall the operating system.

    See your Windows NT documentation for instructions.

    When you reinstall Windows NT 4.0, the operating system detects the second microprocessor.

12. Run the Dell Diagnostics to verify that the new microprocessor is operating correctly.

    See your *Diagnostics and Troubleshooting Guide* for information on running the diagnostics and troubleshooting any problems that may occur.

Replacing the System Battery

A 3.0-V CR2032 coin-cell battery installed on the system board maintains system configuration, date, and time information in a special section of memory.

The operating life of the battery can extend up to 10 years. The battery may need replacing if an incorrect time or date is displayed during the boot routine along with a message such as:

```
Time-of-day not set — please run SETUP program
```

or

```
Invalid configuration information —
please run SETUP program
```

or

```
Strike the F1 key to continue,
F2 to run the setup utility
```

To determine whether the battery needs replacing, reenter the time and date through the System Setup program and exit the program properly to save the information. Turn off and unplug your system for a few hours, and then plug in and turn on your system. Enter the System Setup program. If the date and time are not correct in the System Setup program, replace your battery.

You can operate your system without a battery; however, without a battery, the system configuration information maintained by the battery is erased if the system is unplugged or AC power is lost. In this case, you must enter the System Setup program and reset the configuration options.

WARNING
There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Use the following procedure to replace the system battery with another CR2032 coin-cell battery:

1. If you have not already done so, make a copy of your system configuration information in the System Setup program.

   If the settings are lost while you are replacing the battery, you can refer to your written or printed copy of the system configuration information to restore the

correct settings. See Chapter 3, "Using the System Setup Program," for instructions.

2. Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 7.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. To access the battery on the system board, rotate the power supply as described in "Rotating the Power Supply Away From the System Board" in Chapter 7.

NOTE: If a CD-ROM drive or hard-disk drive in the upper 5.25-inch drive bay obstructs your access to the battery, you may find it helpful to slide the drive forward slightly to provide more room for you to work. See the section in Chapter 9 titled "Installing a Drive in a 5.25-Inch Drive Bay" for instructions.

4. Locate the battery and remove it.

The battery is mounted in a socket labeled "BATTERY" at the upper front-right corner of the system board (as you face the side of the system) (see Figure 8-1).

CAUTION: If you pry the battery out of its socket with a blunt object, be careful not to touch the system board with the object. Make certain that the object is inserted between the battery and the socket before attempting to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking circuit traces on the system board.

Pry the battery out of its socket with your fingers or with a blunt, nonconductive object, such as a plastic screwdriver (see Figure 8-9).
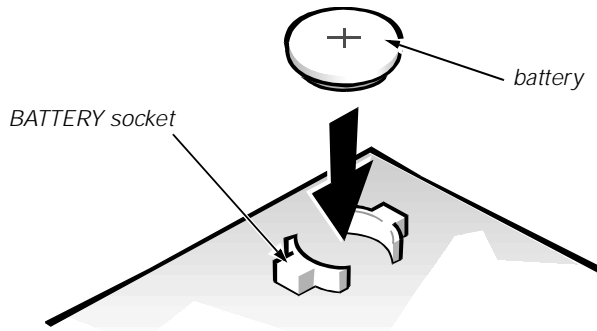

battery

BATTERY socket

Figure 8-9. System Battery and Battery Socket

5. Install the new battery.

Orient the battery with the side labeled "+" facing up. Then insert the battery into the socket, and snap it into place.

6. Rotate the power supply back into position, making sure that the securing tab snaps into place.

7. Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

8. Enter the System Setup program, and confirm that the battery is operating properly.

See Chapter 3, "Using the System Setup Program," for information on running the System Setup program.

Enter the correct time and date through the System Setup program's Time and Date options. Also, restore the correct settings for the system configuration information using the copy made in step 1, and then exit the System Setup program.

9. While in the System Setup program, reset the chassis intrusion detector by changing **Chassis Intrusion** to **Not Detected**.

See Chapter 3, "Using the System Setup Program" for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

10. Turn off your computer, and unplug it for at least 10 minutes.

11. After 10 minutes, plug in the computer, turn it on, and enter the System Setup program. If the time and date are still incorrect, see the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* for instructions on obtaining technical assistance.

CHAPTER 9
Installing Drives

Your Dell computer has five drive bays for installing the following types of drives (see Figure 9-1):

- The externally accessible drive bays at the front of the computer consist of one 3.5-inch drive bay (dedicated to a 3.5-inch diskette drive) and two 5.25-inch bays that can hold up to two half-height, 5.25-inch devices—typically CD-ROM drives. Alternately, 3.5-inch devices can be installed in the 5.25-inch bays using adapters available from Dell.

- The two-bay hard-disk drive cage next to the accessible bays can hold up to two 1-inch hard-disk drives or one 1-inch and one 1.6-inch hard-disk drive installed vertically. The drives must be enhanced integrated drive electronics (EIDE) hard-disk drives.

The next three sections contain information that you will need in several of the installation procedures described later in the chapter. The remaining sections of this chapter cover each type of drive installation.

*NOTES: In all of the following procedures, **left** and **right** refer to your left and right as you face the **front** of the computer.*

Because of the length of the bay, you can only install devices such as Iomega Zip drives in the lower 5.25-inch bay. You can install a CD-ROM drive only in the top 5.25-inch bay.
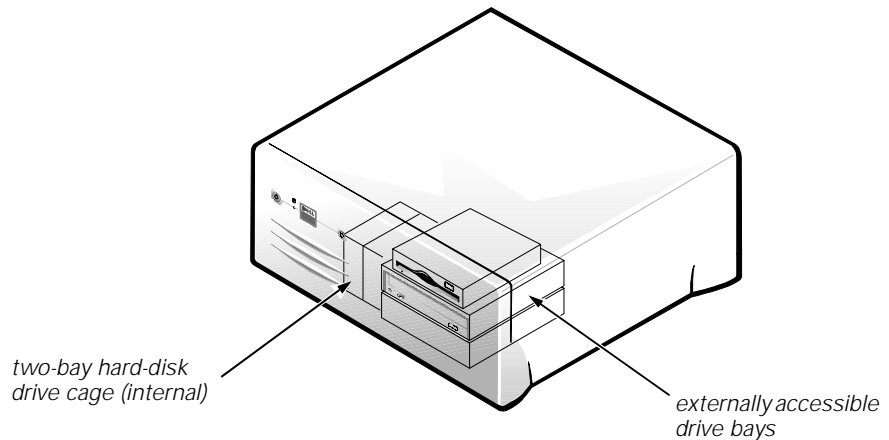
two-bay hard-disk
drive cage (internal)

externally accessible
drive bays

Figure 9-1. Drive Locations

Removing and Replacing Front-Panel Inserts

Empty drive bays contain a front-panel insert to protect the inside of the computer from dust particles and also to ensure proper airflow within the computer. Before you install a drive in an empty drive bay, you must first remove the front-panel insert.

To remove the insert covering a 5.25-inch bay, follow these steps:

1. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.

2. Remove the computer cover as instructed in "Removing the Computer Cover" in Chapter 7.

3. With your thumbs, press in on each end of the insert until the insert snaps free of the cover (see Figure 9-2).
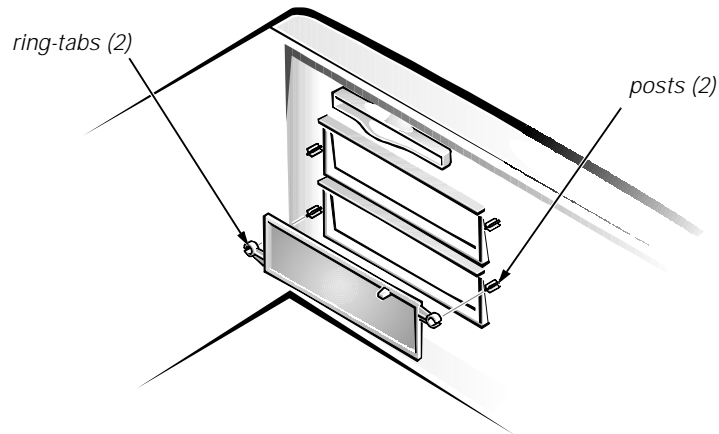
Figure 9-2. Removing the Front-Panel Insert for a 5.25-Inch Bay

To replace a front-panel insert for a 5.25-inch bay, work from inside the cover. Insert the two ring-tabs (one on each end of the insert) over the posts on the inside of the bay opening, and firmly press both ends of the insert into place (see Figure 9-2).

Connecting Drives

When installing a drive, you connect two cables—a DC power cable and an interface cable—to the back of the drive. Your drive's power input connector (to which you connect the DC power cable) resembles the connector shown in Figure 9-3.
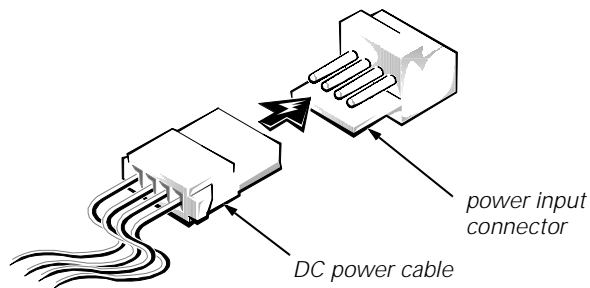

Figure 9-3. DC Power Cable Connector

The drive's interface connector is a card-edge connector or a header connector, as shown in Figure 9-4.
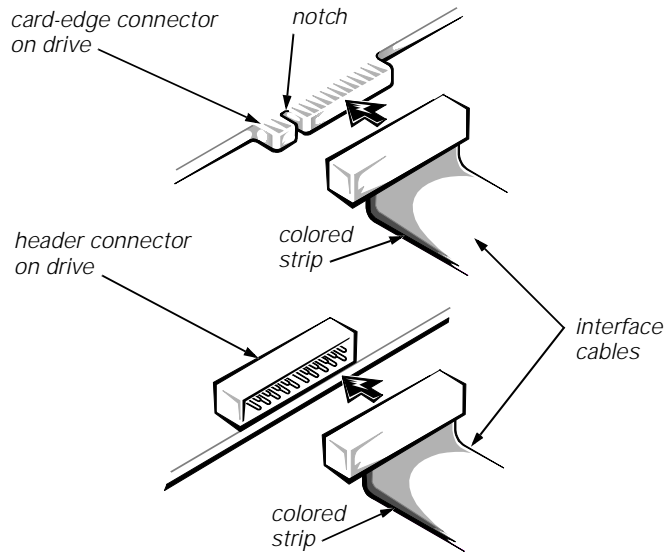
Figure 9-4. Drive Interface Connectors

When attaching the interface cable to a drive, be sure to match the colored strip on the cable to pin 1 of the drive's interface connector. For the location of pin 1 on the drive's interface connector, see the documentation that came with the drive.

When disconnecting an interface cable from the system board, be sure to press in on the locking tabs on the cable connector (if any) before disconnecting the cable. When attaching an interface cable to the system board, be sure that the locking tabs snap into place, ensuring that the cable is firmly attached to the connector on the system board.

Most interface connectors are keyed for correct insertion; that is, a notch or a missing pin on one connector matches a tab or a filled-in hole on the other connector (see Figure 9-4). Keying ensures that the pin-1 wire in the cable (indicated by the colored strip along one edge of the cable) goes to the pin-1 end of the connector.

The pin-1 end of a connector on a board or a card is usually indicated by a silk-screened "1" printed directly on the board or card.

CAUTION: When connecting an interface cable, do not reverse the interface cable (do not place the colored strip away from pin 1 of the connector). Reversing the cable prevents the drive from operating and could damage the controller, the drive, or both.

Installing a Drive in a 5.25-Inch Drive Bay

The upper 5.25-inch drive can accommodate any of the following types of half-height drives:

- A CD-ROM drive that uses the secondary EIDE interface on the system board
- Any 5.25-inch device that uses its own controller card

Because of the length of the bay, the lower 5.25-inch drive bay can only accommodate Zip drives.

To install a drive in a 5.25-inch drive bay, follow these steps:

1. Unpack the drive and prepare it for installation.

   CAUTION: Ground yourself by touching an unpainted metal surface on the back of the computer.

   Check the documentation that accompanied the drive to verify that the drive is configured for your computer system. Change any settings necessary for your configuration.

   If you are installing an EIDE CD-ROM drive, configure the drive for the cable select setting.

2. Remove the computer cover as instructed in "Removing the Computer Cover" in Chapter 7.

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. Remove the drive bracket from the bay you want to use.

   Squeeze the metal tabs that extend from each side of the drive bracket toward each other, and pull the bracket out of the bay (see Figure 9-5).

   NOTE: For easier access inside the chassis, you may want to rotate the power supply out of the way temporarily. To do so, see "Rotating the Power Supply Away From the System Board" in Chapter 7.
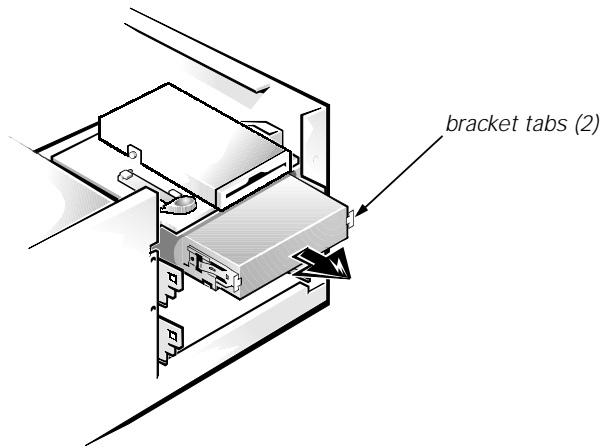
Figure 9-5. Removing a Drive

If a drive is already installed in the bay and you are replacing it, be sure to disconnect the DC power cable and interface cable from the back of the drive before sliding the bracket out of the bay. To remove the old drive from the bracket, unscrew the four screws that secure the drive to the bracket (see Figure 9-6).

4. Attach the bracket to the new drive.

Locate the four screw holes around the drive's perimeter. Fit the bracket over the drive, and then tilt the front of the drive up so that the bracket drops down into place. To ensure proper installation, all screw holes should be aligned and the tabs on the front of the bracket should be flush with the front of the drive (see Figure 9-6).
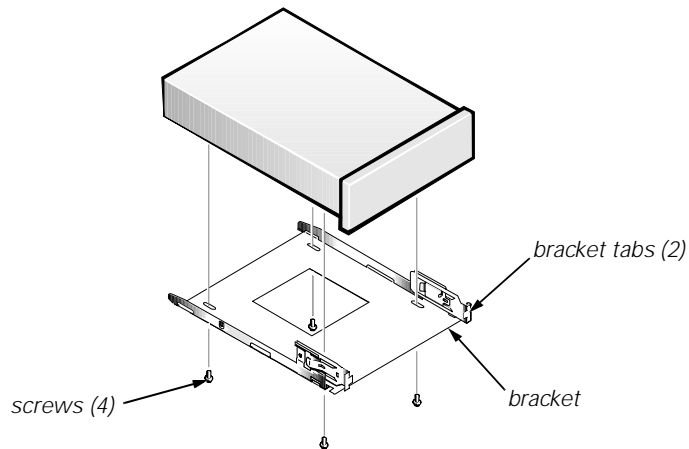
Figure 9-6. Attaching the Drive Bracket to the New Drive

To further ensure proper positioning of the drive in the chassis, insert and tighten all four screws *in the order in which the holes are numbered* (the holes are marked "1" through "4").

5. Slide the new drive into the drive bay until it snaps securely into place (see Figure 9-7).

   Make sure that both bracket tabs snap into place in the drive bay.

5.25-inch drive

Figure 9-7. Inserting the New Drive Into the Drive Bay

6. If you are installing a drive that has its own controller card, install the controller card in an expansion slot.

   See "Installing an Expansion Card" in Chapter 8.

7. Connect a DC power cable to the power input connector on the back of the drive (see Figure 9-8).

power input connector
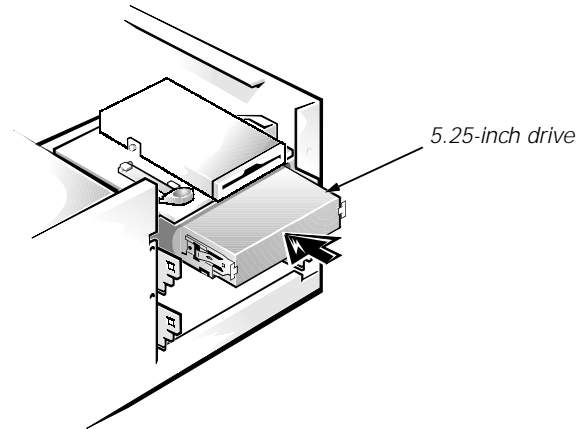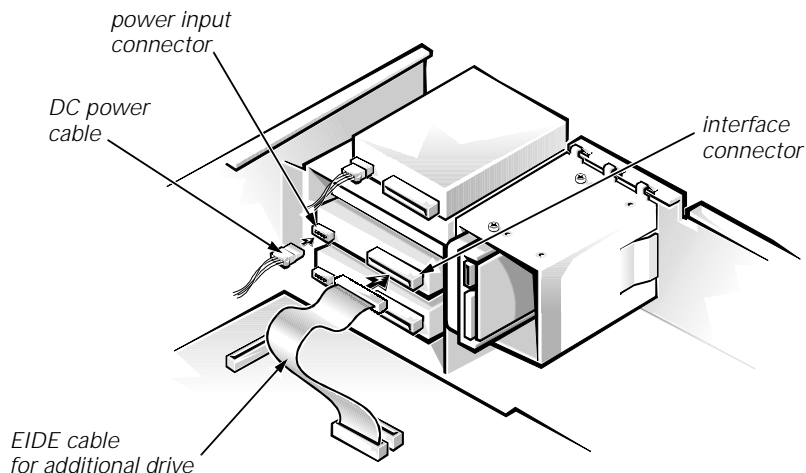
DC power cable

interface connector

EIDE cable for additional drive

Figure 9-8. Attaching EIDE Drive Cables

8. Connect the appropriate interface cable to the interface connector on the back of the drive (see Figure 9-8).

   If your system came with an EIDE CD-ROM drive, use the spare connector on the existing interface cable. Otherwise, use the EIDE cable provided in the drive kit.

   CAUTION: You must match the colored strip on the cable with pin 1 on the drive's interface connector to avoid possible damage to your system.

9. For an EIDE drive or CD-ROM drive, connect the other end of the interface cable to the interface connector labeled "IDE2" on the system board (see Figure 8-1).

   For a diskette drive, connect the cable from the drive to the interface connector labeled "DISKETTE" on the system board.

   For a drive that comes with its own controller card, connect the other end of the interface cable to the controller card.

   Check all cable connections. Fold cables out of the way to provide airflow for the fan and cooling vents.

10. If the 5.25-inch drive bay was previously empty, remove the front-panel insert from the front cover.

    See "Removing and Replacing Front-Panel Inserts" found earlier in this chapter.

11. Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.

NOTE: After you remove and replace the chassis, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

`ALERT! Cover was previously removed.`

12. To reset the chassis intrusion detector, enter the System Setup program and reset **Chassis Intrusion** to **Not Detected**.

See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

13. Update your system configuration information.

For a diskette drive, update the appropriate **Diskette Drive** category (**A** or **B**) on Page 1 of the System Setup screens to reflect the size and capacity of your new diskette drive. (For more information, see Chapter 3, "Using the System Setup Program.")

For EIDE CD-ROM and other drives, set the appropriate **Drive** category (**0** or **1**) under **Drives**: **Secondary** to **Auto**.

14. Verify that your system works correctly.

See your *Diagnostics and Troubleshooting Guide* for information on running the Dell Diagnostics and troubleshooting any problems that may occur. Use the following guidelines to determine which test to use:

- If you installed a diskette drive, test it by running all of the subtests in the Diskette Drives Test Group of the Dell Diagnostics.

- If you installed a CD-ROM drive, see the documentation that came with the drive for instructions on loading device drivers and using the drive. If it is an EIDE CD-ROM drive, test it by running all of the subtests in the IDE CD-ROM Drives Test Group of the Dell Diagnostics.

Installing an EIDE Hard-Disk Drive

This section includes information on installing, partitioning, and formatting EIDE hard-disk drives. Up to two 1-inch hard-disk drives or one 1-inch and one 1.6-inch hard-disk drive can be installed vertically in the internal hard-disk drive cage that is next to the externally accessible 5.25-inch drive bays.

EIDE Drive Addressing

All EIDE devices should be configured for the cable select jumper position, which assigns master and slave status to devices by their position on the EIDE cable. When two EIDE devices are connected to a single EIDE cable and are configured for the cable select jumper position, the device attached to the last connector on the interface cable is the master or boot device (drive 0) and the device attached to the middle connector on the interface cable is the slave device (drive 1). Refer to the drive documentation in your upgrade kit for information on setting devices to the cable select jumper position.

With the two EIDE interface connectors on the system board, your system can support up to four EIDE devices. EIDE hard-disk drives should be connected to the EIDE interface connector labeled "IDE1." (EIDE drives and CD-ROM drives should be connected to the EIDE interface connector labeled "IDE2.")

Installing an EIDE Hard-Disk Drive in the Hard-Disk Drive Bracket

Install an EIDE hard-disk drive in the hard-disk drive bracket as follows:

1. If you are replacing a hard-disk drive that contains data you want to keep, be sure to make a backup of your files before you continue with this procedure.

2. Prepare the drive for installation.

    CAUTION: Ground yourself by touching an unpainted metal surface on the back of the computer.

    CAUTION: When you unpack the drive, do not set it on a hard surface, which may damage the drive. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

    Check the documentation that accompanied the drive to verify that it is configured for your computer system.

3. Remove the drive bracket from the chassis.

    If any hard-disk drives are already installed in the bracket, disconnect the DC power cable and interface cable from each drive.

    Remove the screw holding the drive bracket to the drive bay. Lift up on the drive bracket to disengage it from the latch on the drive bay and the three hooks on the front of the chassis (see Figure 9-9). Remove the bracket.
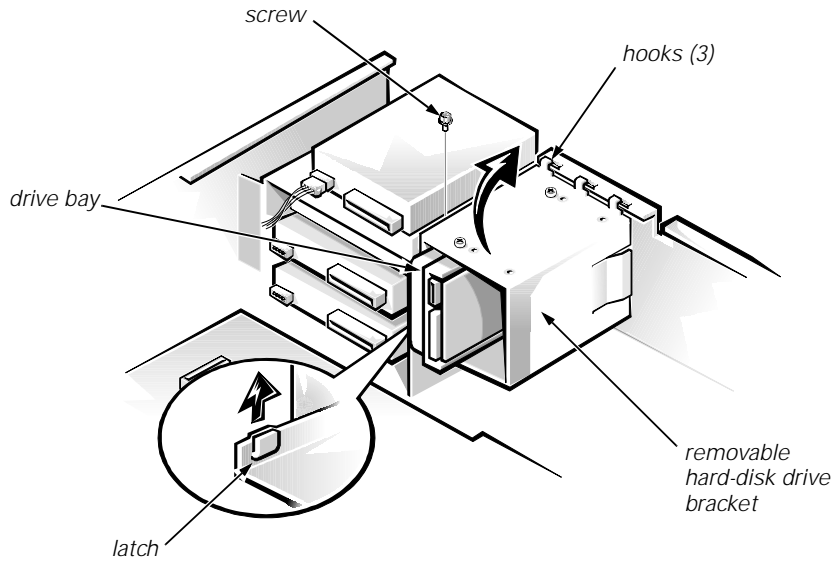
screw

hooks (3)

drive bay

latch

removable
hard-disk drive
bracket

Figure 9-9. Removing the Hard-Disk Drive Bracket

4. Slide the drive into the chosen bay of the bracket, orienting it so that the connectors on the back of the drive face the inside of the chassis when the bracket is reinstalled and so that the drive is in the left-most position in the bracket (see Figure 9-10).

You must install a drive in the primary drive bay. The primary drive bay is the left-most bay in the bracket and is marked as "HD1" on the top surface of the bracket. The secondary drive bay is marked as "HD2."
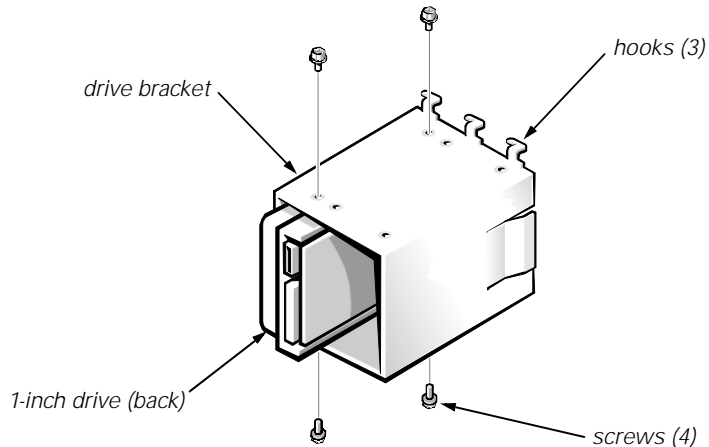

hooks (3)

drive bracket

1-inch drive (back)

screws (4)

Figure 9-10. Inserting a 1-Inch Hard-Disk Drive Into the Bracket

5. Align the four screw holes of the drive and bracket. Insert and tighten the screws that came with your upgrade kit.

   Use the four screw holes in the top and bottom of the bracket (see Figure 9-10) to secure the installed hard-disk drive(s).

6. Reinstall the hard-disk drive bracket into the chassis (see Figure 9-11).

   Insert the bracket into the chassis by inserting the hooks in the slots on the front of the chassis. Then lower the bracket to the bottom of the chassis, making sure that the latch on the drive bay is engaged. Replace the screw holding the drive bracket to the drive bay.
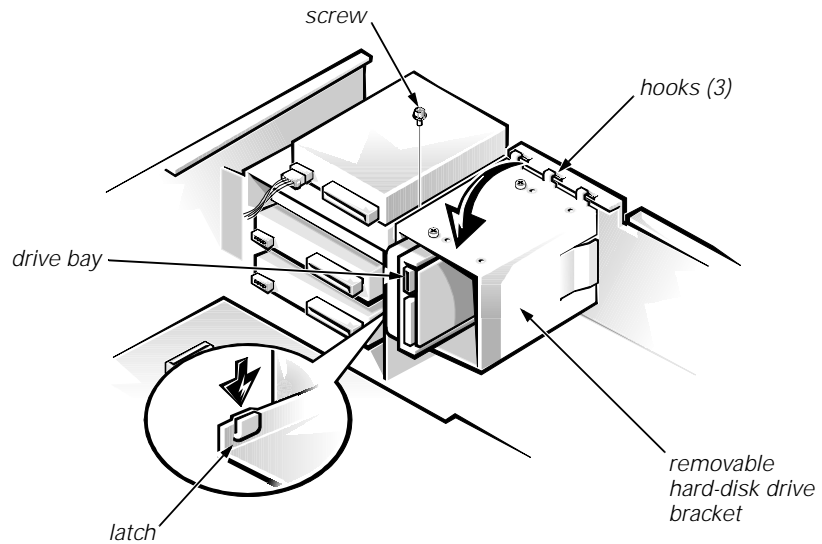

Figure 9-11. Inserting the Hard-Disk Drive Bracket Into the Chassis

7. Connect a DC power cable to the power input connector on the back of the drive (see Figure 9-12).

   Check all connectors to be certain that they are properly cabled and firmly seated.
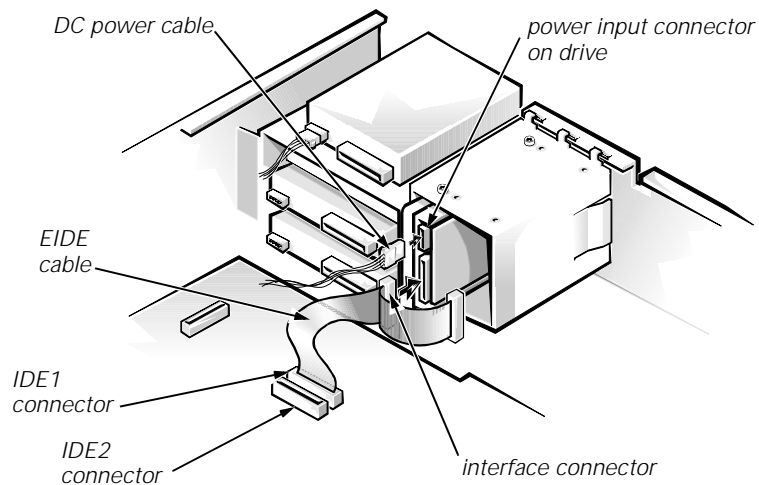
DC power cable

power input connector on drive

EIDE cable

IDE1 connector

IDE2 connector

interface connector

Figure 9-12. Attaching Hard-Disk Drive Cables

8. Connect one of the device connectors on the EIDE cable to the 40-pin interface connector on the back of the hard-disk drive (see Figure 9-12).

CAUTION: You must match the colored strip on the EIDE cable with pin 1 on the drive's interface connector to avoid possible damage to your system.

9. If the other end of the EIDE cable is not already connected, connect it to the IDE1 connector on the system board.

CAUTION: You must match the colored strip on the EIDE cable with pin 1 on the IDE1 connector to avoid possible damage to your system.

To locate the IDE1 connector, see Figure 8-1.

10. Replace the computer cover. Then reconnect your computer and peripherals to their electrical outlets, and turn them on.

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

`ALERT! Cover was previously removed.`

11. Insert a bootable diskette (such as the *Dell Diagnostics Diskette*) into drive A.

12. Enter the System Setup program, and update the appropriate **Drive** category (**0** or **1**) under **Drives: Primary**.

See "Drives: Primary and Secondary" in Chapter 3.

13. While in the System Setup program, reset the chassis intrusion detector by changing **Chassis Intrusion** to **Not Detected**.

    See Chapter 3, "Using the System Setup Program," for instructions.

    NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

    After you update the System Setup settings, reboot the system.

14. Partition and logically format your drive, as described in the next subsection, before proceeding to the next step.

15. Test the hard-disk drive by running the Hard-Disk Drives (Non-SCSI) Test Group in the Dell Diagnostics.

    See your *Diagnostics and Troubleshooting Guide* for information on running the diagnostics and troubleshooting any problems that may occur.

16. Install your operating system on the hard-disk drive.

    Refer to the documentation that came with your operating system.

Partitioning and Logically Formatting Your EIDE Hard-Disk Drive

EIDE hard-disk drives must be physically formatted, partitioned, and logically formatted before they can be used to store data. Every hard-disk drive from Dell is physically formatted before it is sent to you.

NOTE: When using the Windows NT operating system with the 16-bit file allocation table (FAT 16) file system, the primary partition for each hard-disk drive can be no larger than 2 gigabytes (GB). Extended partitions can be larger than 2 GB, but each logical drive within an extended partition must be no larger than 2 GB.

To partition and logically format your hard-disk drive, use the program(s) offered by your operating system.

APPENDIX A
Technical Specifications

Table A-1. Technical Specifications

Microprocessor	
Microprocessor type	Intel Pentium II microprocessor that runs at 350, 400, or 450 MHz internally/ 100 MHz externally. A slower compatibility speed can be set through the System Setup program.
Internal cache	32-KB (16-KB data cache; 16-KB instruction cache)
L2 cache	512-KB pipelined burst, four-way set-associative, write-back ECC SRAM on each SEC cartridge
Math coprocessor	internal to the microprocessor
System Information	
System chip set	Intel 440BX PCIset
Data bus width	64 bits
Address bus width.	32 bits
DMA channels	seven
Interrupt levels.	15
System BIOS chip	2 Mb
Audio controller	16-bit Plug and Play Crystal 4237B

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications (continued)

System Information (continued)	
NIC	3Com 3C905b-TX Wakeup On LAN-capable
I/O controller	National PC 87309

Expansion Bus	
Bus types	PCI, ISA, and AGP
Bus speed	PCI: 33.3 MHz ISA: 8.33 MHz AGP: 66.6 MHz (2X-capable)
PCI expansion-card connectors	three (one of the PCI connectors shares a card-slot opening with the ISA connector)
ISA expansion-card connectors	one (the ISA connector shares a card-slot opening with one of the PCI connectors)
AGP expansion-card connectors	one
PCI expansion-card connector size	120 pins
PCI expansion-card connector data width (maximum)	32 bits
ISA expansion-card connector size	98 pins
ISA expansion-card connector data width (maximum)	16 bits
AGP expansion-card connector size	124 pins
AGP expansion-card connector data width (maximum)	32 bits

System Clocks	
System clock	100 MHz
SDRAM memory clock	100 MHz
I/O APIC clock	14 MHz
Diskette/communications ports	48 MHz
USB clock	48 MHz

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications (continued)

Memory	
Architecture	72-bit ECC SDRAM
DIMM sockets	four
DIMM capacities	32-, 64-, and 128-MB unbuffered, 72-bit SDRAM
Standard RAM	64 MB
Maximum RAM	512 MB
BIOS address	F000:0000h–F000:FFFFh

Drives	
Externally accessible bays	one 3.5-inch bay dedicated to a 3.5-inch diskette drive; two 5.25-inch bays, one for Zip drives, and the other for CD-ROM drives, or other 5.25-inch peripherals
Internally accessible bays	one 1.6-inch drive bay and one 1-inch drive bay for EIDE hard-disk drives installed vertically

Ports and Connectors	
Externally accessible:	
Serial (DTE)	two 9-pin connectors; 16550-compatible
Parallel	one 25-pin connector (bidirectional)
Video	one 15-pin connector (on video card)
PS/2-style keyboard	6-pin mini-DIN connector
PS/2-compatible mouse	6-pin mini-DIN connector
NIC	RJ45 connector
USB	two USB-compliant 4-pin connectors
Audio line in	1/8-inch miniature audio jack
Audio line out	1/8-inch miniature audio jack
Audio microphone in	1/8-inch miniature audio jack

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications *(continued)*

Internally accessible:

    EIDE drive. . . . . two 40-pin connectors on PCI local bus

    Diskette drive . . . . one 34-pin connector

    CD-ROM drive audio interface . . . . 4-pin connector

    Wakeup On LAN . . . . 3-pin connector

    Fan . . . . 3-pin connector

Control panel connectors:

    Thermal sensor . . . . 3-pin connector

    Chassis intrusion. . . . . 2-pin connector

    Speaker. . . . . 4-pin connector

Video

Video type . . . . AGP video card (see manufacturer's specifications)

Key Combinations

<Ctrl><Alt><Del> . . . . restarts (reboots) the system

<F2> or <Ctrl><Alt><Enter> . . . . starts System Setup program (during POST only)

Controls and Indicators

Reset control. . . . . push button

Power control . . . . push button

Power indicator/sleep mode indicator . . . . green LED (indicates power)
amber LED (indicates sleep mode)

Hard-disk drive access indicator . . . . green LED

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications (continued)

Controls and Indicators (continued)	
Link integrity indicator (on NIC connector).	green LED
Network activity indicator (on NIC connector).	yellow LED
Power indicator (on system board)	green LED
Standby power indicator (on system board)	green LED

Power	
DC power supply:	
Wattage	230 W
Heat dissipation	600 BTU/hr (nominal)
Voltage	90 to 135 V at 60 Hz; 180 to 265 V at 50 Hz; Switch-selectable
Backup battery.	3-V CR2032 coin cell

Physical	
Height	16.51 cm (6.5 inches)
Width.	43.43 cm (17.1 inches)
Depth.	44.19 cm (17.4 inches)
Weight	13.28 kg (29.5 lb) or more, depending on options installed

Environmental	
Temperature:	
Operating	10° to 35°C°* (50° to 95°F)
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz for 30 min
Storage	0.5 G at 3 to 200 Hz for 30 min

*　At 35°C (95°F), the maximum operating altitude is 914 m (3000 ft).

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications (continued)

Maximum shock:

    Operating . . . . half-sine wave form: 50 G for 2 ms

    Storage . . . . half-sine wave form: 110 G for 2 ms
                                            square wave form: 27 G for 15 ms

Altitude:

    Operating . . . . –16 to 3048 m* (–50 to 10,000 ft)

    Storage . . . . –16 to 10,600 m (–50 to 35,000 ft)

*   *At 35°C (95°F), the maximum operating altitude is 914 m (3000 ft).*

NOTE: *For the full name of an abbreviation or acronym used in this table, see the Glossary.*

APPENDIX B
Hardware Configuration Features

This appendix provides specific information about the jumpers on your system board and the input/output (I/O) ports and connectors on the back panel of your computer. It also provides some basic information on jumpers and switches, a listing of interrupt request (IRQ) assignments, and memory maps.

Jumpers and Switches—A General Explanation

Jumpers and switches provide a convenient and reversible way of reconfiguring the circuitry on a printed circuit board. When reconfiguring your system, you may need to change jumper settings on your system board; you may also need to change jumper and/or switch settings on expansion cards or drives.

Jumpers

Jumpers are small blocks on a circuit board with two or more pins emerging from them. Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit.
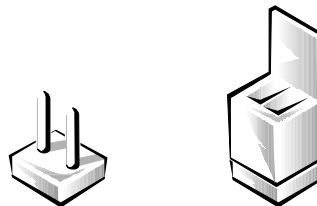
To change a jumper setting, pull the plug off its pin(s) and carefully fit it down onto the pin(s) indicated.

CAUTION: Make sure your system is turned off before you change a jumper setting. Otherwise, damage to your system or unpredictable results may occur.

A jumper is referred to as *open* or *unjumpered* when the plug is pushed down over only one pin or if there is no plug at all. When the plug is pushed down over two pins, the jumper is referred to as *jumpered.* The jumper setting is often shown in text as two numbers, such as *1-2.* The number *1* is printed on the circuit board so that you can identify each pin number based on the location of pin 1.

Figure B-1 shows the location and default settings of the jumper blocks on your system board. See Table B-1 for the designations, default settings, and functions of your system's jumpers.

Switches

Switches control various circuits or functions in your computer system. The switches you are most likely to encounter are dual in-line package (DIP) switches, which are normally packaged in groups of two or more switches in a plastic case. Two common types of DIP switches are *slide* switches and *rocker* switches (see the following illustration).
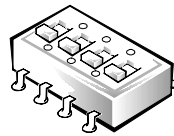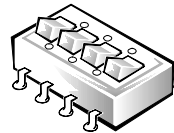
slide switches   rocker switches

Each of these switches has two positions, or *settings* (usually *on* and *off*). To change the setting of a slide switch, use a small, pointed object such as a small screwdriver or a straightened paper clip to slide the switch to the proper position. To change the setting of a rocker switch, use the screwdriver or paper clip to press down on the appropriate side of the switch. In either case, do not use a pen, pencil, or other object that might leave a residue on the switch.

RSVD2
RSVD1
450 MHZ
400 MHZ
350 MHZ
300 MHZ
TOWER
BIOS
PSWD
NICCFG

jumpered   unjumpered
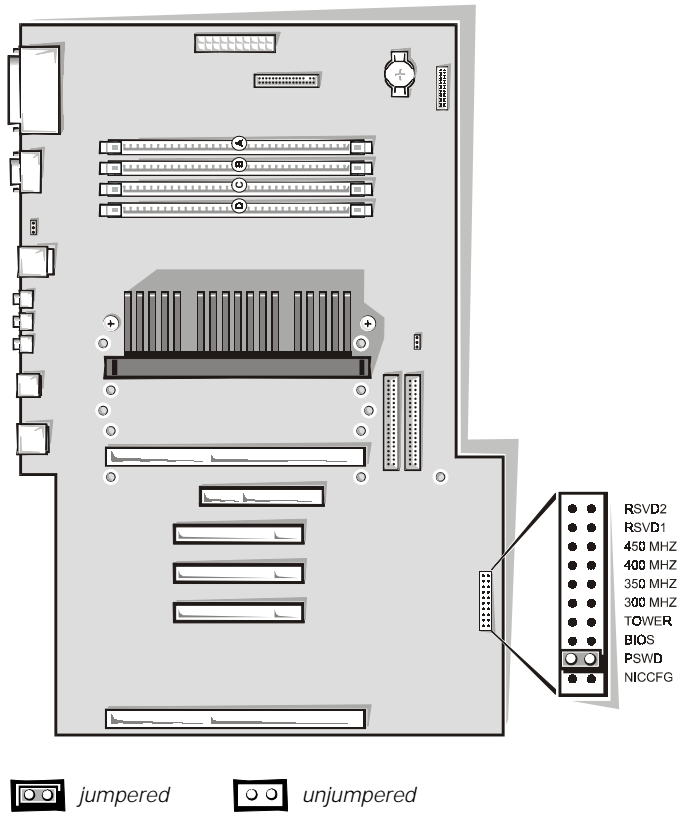
Figure B-1. System Board Jumpers

Table B-1. System-Board Jumper Settings

Jumper	Setting		Description
RSVD2	⊙⊙		Reserved (*do not install jumper plug*).
RSVD1	⊙⊙		Reserved (*do not install jumper plug*).
450MHZ*	⊙⊙		Jumpered when the microprocessor's internal speed is 450 MHz.
400MHZ*	⊙⊙		Jumpered when the microprocessor's internal speed is 400 MHz.
350MHZ*	⊙⊙		Jumpered when the microprocessor's internal speed is 350 MHz.
300MHZ	⊙⊙		Reserved (*do not install jumper plug*).
TOWER	⊙⊙		Reserved (*do not install jumper plug*).
BIOS	⊙⊙		Reserved *(do not install jumper plug)*.
PSWD	▣⊙⊙	(default)	Password features enabled.
	⊙⊙		Password features disabled.
NICCFG	⊙⊙		Reserved *(do not install jumper plug)*.

*   One set of the speed jumper pins must have a jumper plug installed; otherwise, the system
     will operate at an undetermined speed.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

▣⊙⊙ *jumpered*   ⊙⊙ *unjumpered*

System Board Labels

Table B-2 lists the labels for connectors and sockets on your system board and gives a brief description of their functions.

Table B-2. System Board Connectors and Sockets

Connector or Socket	Description
AGP	AGP video card connector
AUX LED	Hard-disk drive access indicator connector
BATTERY	Battery socket
CD-IN	CD-ROM drive audio interface connector
DIMM_x	DIMM socket
DISKETTE, DISK2	Diskette drive interface connector
ENET	NIC connector
FAN	Microprocessor fan connector
IDEn	EIDE interface connector
ISA1*	ISA expansion-card connector
KYBD/MOUSE	Keyboard connector and mouse connector (stacked)
LAN	Wakeup On LAN card connector
LINE-IN	Line-in jack
LINE-OUT	Line-out jack
MIC-IN	Microphone jack
PANEL	Control panel connector
PARALLEL	Parallel port connector (sometimes referred to as *LPT1*)
PCIn*	PCI expansion-card connectors
POWER1	Main power input connector

*   The connector pair ISA1/PCI3 share a single card-slot opening so that only one connector of the pair can be used.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table B-2. System Board Connectors and Sockets (continued)

Connector or Socket	Description
SERIAL1/2	Serial port connectors (sometimes referred to as *COM1* and *COM2*; stacked)
SLOT1_PRI	Primary Pentium II processor SEC cartridge connector
SLOT1_SEC	Secondary Pentium II processor SEC cartridge connector
USB	USB connectors

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

I/O Ports and Connectors

The I/O ports and connectors on the back panel of your computer are the gateways through which your computer system communicates with external devices, such as a keyboard, mouse, printer, and monitor. Figure B-2 identifies the I/O ports and connectors for your computer.
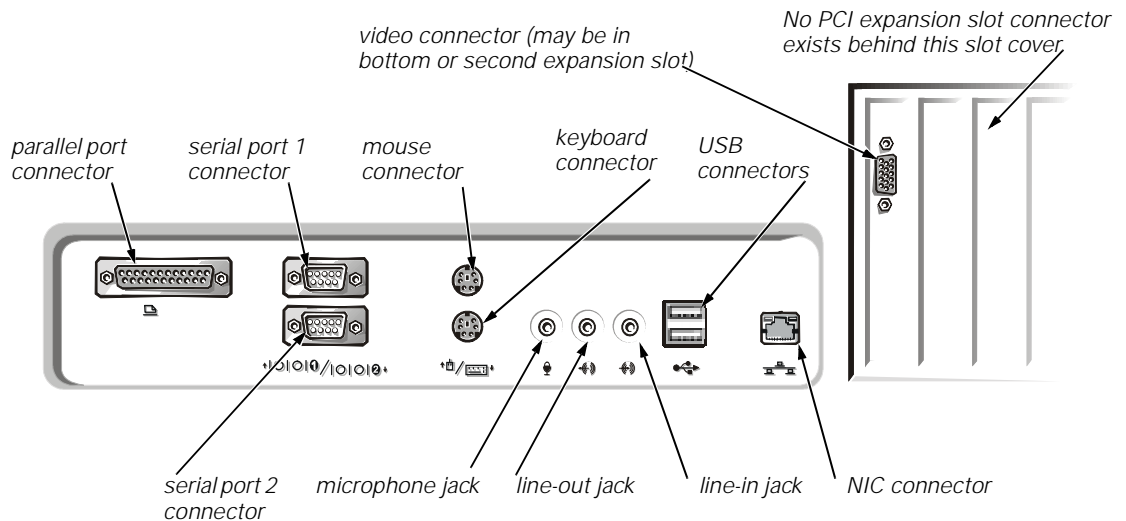
Figure B-2. I/O Ports and Connectors

Serial and Parallel Ports

The two built-in serial ports use 9-pin D-subminiature connectors on the back panel. These ports support devices such as external modems, printers, plotters, and mice that require serial data transmission (the transmission of data one bit at a time over one line).

Most software uses the term COM (for COMmunications) plus a number to designate a serial port (for example, COM1 or COM2). The default designations of your computer's built-in serial ports are COM1 and COM2.

The built-in parallel port uses a 25-pin D-subminiature connector on the computer's back panel. This I/O port sends data in parallel format (where eight data bits, or one byte, are sent simultaneously over eight separate lines in a single cable). The parallel port is used primarily for printers.

Most software uses the term LPT (for Line PrinTer) plus a number to designate a parallel port (for example, LPT1). The default designation of your computer's built-in parallel port is LPT1.

Port designations are used, for example, in software installation procedures that include a step in which you identify the port to which your printer is attached, thus telling your software where to send its output. (An incorrect designation prevents the printer from printing or causes scrambled print.)

Adding an Expansion Card Containing Serial or Parallel Ports

Your computer system has an autoconfiguration capability for the serial ports. This feature lets you add an expansion card containing a serial port that has the same designation as one of the built-in ports without having to reconfigure the card. When the computer detects the duplicate serial port on the expansion card, it *remaps* (reassigns) the built-in port to the next available port designation.

Both the new and the remapped COM ports share the same IRQ setting, as follows:

COM1, COM3: IRQ4 (shared setting)
COM2, COM4: IRQ3 (shared setting)

These COM ports have the following I/O address settings:

COM1: 3F8h
COM2: 2F8h
COM3: 3E8h
COM4: 2E8h

For example, if you add an internal modem card with a port configured as COM1, the computer then sees logical COM1 as the address on the modem card. It automatically remaps the built-in serial port that was designated as COM1 to COM3, which shares the COM1 IRQ setting. (Note that when you have two COM ports sharing an IRQ setting, you can use either port as necessary *but you may not be able to use them both at the same time.*) If you install one or more expansion cards with serial ports designated as COM1 and COM3, the corresponding built-in serial port is disabled, as described in "Serial Port 1 and Serial Port 2" in Chapter 3.

Before adding a card that remaps the COM ports, check the documentation that accompanied your software to make sure that the software can be mapped to the new COM port designation.

To avoid autoconfiguration, you may be able to reset the expansion card's jumpers or switches so that *its* port designation changes to the next available COM number, leaving the designation for the built-in port as is. Alternatively, you can disable the built-in ports through the System Setup program. The documentation for your expansion card should provide the card's default I/O address and allowable IRQ settings. It should also provide instructions for readdressing the port and changing the IRQ setting if necessary.

The built-in parallel port has autoconfiguration capability through the System Setup program. That is, if you set the parallel port to its automatic configuration and add an expansion card containing a port configured as LPT1 (IRQ7, I/O address 378h), the system automatically remaps the built-in parallel port to its secondary address (IRQ5, I/O address 278h). If the secondary port address is already being used, the built-in parallel port is turned off. For more information, see "Parallel Port" in Chapter 3.

For general information on how your operating system handles serial and parallel ports as well as for more detailed command procedures, see your operating system documentation.

Serial Port Connectors

If you reconfigure your hardware, you may need pin number and signal information for the serial port connectors. Figure B-3 illustrates the pin numbers for the serial port connectors, and Table B-3 lists and defines the pin assignments and interface signals for the serial port connectors.
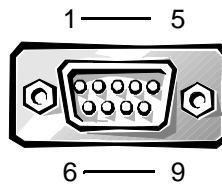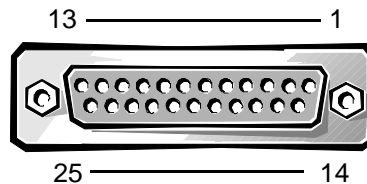

Figure B-3. Pin Numbers for the Serial Port Connectors

Table B-3. Pin Assignments for the Serial Port Connectors

Pin	Signal	I/O	Definition
1	DCD	I	Data carrier detect
2	SIN	I	Serial input
3	SOUT	O	Serial output
4	DTR	O	Data terminal ready
5	GND	N/A	Signal ground

Table B-3. Pin Assignments for the Serial Port Connectors *(continued)*

Pin	Signal	I/O	Definition
6	DSR	I	Data set ready
7	RTS	O	Request to send
8	CTS	I	Clear to send
9	RI	I	Ring indicator
Shell	N/A	N/A	Chassis ground

Parallel Port Connector

If you reconfigure your hardware, you may need pin number and signal information for the parallel port connector. Figure B-4 illustrates the pin numbers for the parallel port connector, and Table B-4 lists and defines the pin assignments and interface signals for the parallel port connector.


Figure B-4. Pin Numbers for the Parallel Port Connector

Table B-4. Pin Assignments for the Parallel Port Connector

Pin	Signal	I/O	Definition
1	STB#	I/O	Strobe
2	PD0	I/O	Printer data bit 0
3	PD1	I/O	Printer data bit 1
4	PD2	I/O	Printer data bit 2
5	PD3	I/O	Printer data bit 3
6	PD4	I/O	Printer data bit 4
7	PD5	I/O	Printer data bit 5
8	PD6	I/O	Printer data bit 6
9	PD7	I/O	Printer data bit 7

Table B-4. Pin Assignments for the Parallel Port Connector

Pin	Signal	I/O	Definition
10	ACK#	I	Acknowledge
11	BUSY	I	Busy
12	PE	I	Paper end
13	SLCT	I	Select
14	AFD#	O	Automatic feed
15	ERR#	I	Error
16	INIT#	O	Initialize printer
17	SLIN#	O	Select in
18–25	GND	N/A	Signal ground

Keyboard and Mouse Connectors

Your system uses a Personal System/2 (PS/2)-style keyboard and supports a PS/2-compatible mouse. Cables from both devices attach to 6-pin miniature *Deutsche Industrie Norm* (DIN) connectors on the back panel of your computer.

A PS/2-compatible mouse works identically to an industry-standard serial mouse or bus mouse except that it has its own dedicated connector, which frees up both serial ports and does not require an expansion card. Circuitry inside the mouse detects the movement of a small ball and relays the direction to the computer.

Mouse driver software can give the mouse priority with the microprocessor by issuing IRQ12 whenever a new mouse movement is made. The driver software also passes along the mouse data to the application program that is in control.

Keyboard Connector

If you reconfigure your hardware, you may need pin number and signal information for the keyboard connector. Figure B-5 illustrates the pin numbers for the keyboard connector, and Table B-5 lists and defines the pin assignments and interface signals for the keyboard connector.
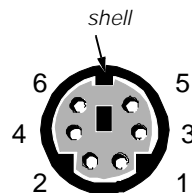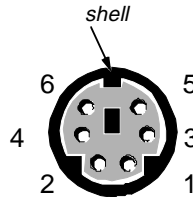

Figure B-5. Pin Numbers for the Keyboard Connector

Table B-5. Pin Assignments for the Keyboard Connector

Pin	Signal	I/O	Definition
1	KBDATA	I/O	Keyboard data
2	NC	N/A	No connection
3	GND	N/A	Signal ground
4	FVcc	N/A	Fused supply voltage
5	KBCLK	I/O	Keyboard clock
6	NC	N/A	No connection
Shell	N/A	N/A	Chassis ground

Mouse Connector

If you reconfigure your hardware, you may need pin number and signal information for the mouse connector. Figure B-6 illustrates the pin numbers for the mouse connector, and Table B-6 lists and defines the pin assignments and interface signals for the mouse connector.
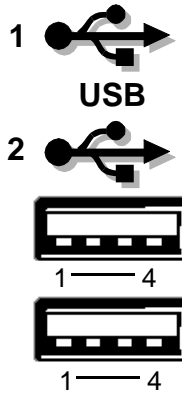

Figure B-6. Pin Numbers for the Mouse Connector

Table B-6. Pin Assignments for the Mouse Connector

Pin	Signal	I/O	Definition
1	MFDATA	I/O	Mouse data
2	NC	N/A	No connection
3	GND	N/A	Signal ground
4	FVcc	N/A	Fused supply voltage
5	MFCLK	I/O	Mouse clock
6	NC	N/A	No connection

Video Connector

For information on your video connector, see the manufacturer's specifications that accompanied your video card.

NIC Connector

Your system contains an RJ45 connector (see Figure B-7) on the back panel for attaching an unshielded twisted pair (UTP) Ethernet cable, which is used in 10BASE-T and 100BASE-TX networks. The network interface controller (NIC) provides all the functions normally handled by a separate network expansion card. To connect your system to and configure it for use on an Ethernet network, see Chapter 5, "Using the Network Interface Controller."
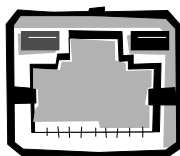
Figure B-7. NIC Connector

USB Connectors

Your system contains two Universal Serial Bus (USB) connectors for attaching USB-compliant devices. USB devices are typically peripherals such as keyboards, mice, printers, and computer speakers.

CAUTION: Do not attach a USB device or a combination of USB devices that draw a maximum current over 500 milliamperes (mA) per channel at +5 volts (V). Attaching devices that exceed this threshold may cause the USB ports to shut down. See the documentation that accompanied the USB devices for their maximum current ratings.

If you reconfigure your hardware, you may need pin number and signal information for the USB connectors. Figure B-8 illustrates the pin numbers for the USB connectors, and Table B-7 lists and defines the pin assignments and interface signals for the USB connectors.

Figure B-8. Pin Numbers for the USB Connectors

Table B-7. Pin Assignments for the USB Connectors

Pin	Signal	I/O	Definition
1	Vcc	N/A	Supply voltage
2	DATA	I	Data in
3	+DATA	O	Data out
4	GND	N/A	Signal ground

Microphone Jack

The microphone jack (see Figure B-9) can be used to attach a standard personal computer microphone. Connect the audio cable from the microphone to the microphone jack. The microphone input is a mono source with maximum signal levels of 89 millivolts root mean squared (mVrms).

Figure B-9. Microphone Jack

Line-Out Jack

The line-out jack (see Figure B-10) can be used to attach most computer speakers. The line-out jack is amplified, so speakers with integrated amplifiers are not required. Connect the audio cable from the speakers to this jack.

Figure B-10. Line-Out Jack

Line-In Jack

The line-in jack (see Figure B-11) can be used to attach record/playback devices such as cassette players, CD players, and VCRs. Connect the line-out cable from any of these devices to the line-in jack on the back of your computer.
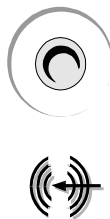
Figure B-11. Line-In Jack

Interrupt Assignments

Problems can arise if two devices attempt to use the same IRQ line. To avoid this type of conflict, check the documentation for the default IRQ line setting for each installed device. Then consult Table B-8 to configure each device for one of the available IRQ or other lines.

NOTE: Interrupts for the on-board sound and NIC are assigned dynamically by the system basic input/output system (BIOS).

Table B-8. Interrupt Assignments

IRQ Line	Used By/Available
IRQ0	System timer
IRQ1	Keyboard controller
IRQ2	Interrupt controller (enables IRQ8 through IRQ15)
IRQ3 and IRQ4	Serial ports (if enabled in System Setup program)
IRQ5	Available
IRQ6	Diskette drive interface
IRQ7	Parallel port (if enabled in System Setup program)
IRQ8	RTC
IRQ9	ACPI
IRQ10	Available
IRQ11	Available
IRQ12	Mouse controller
IRQ13	Math coprocessor
IRQ14	Primary EIDE interface (if enabled in System Setup program)
IRQ15	Secondary EIDE interface (if enabled in System Setup program)

NOTE: For the full name of an abbreviation or acronym used in the table, see the Glossary.

Memory Allocations

A microprocessor and programs operating under MS-DOS (real-mode operation) can address only 1 megabyte (MB) (1024 kilobytes [KB]) of system memory. This area is divided into *conventional memory* (sometimes called *base memory*) and upper memory. All system memory above this 1 MB is called *extended memory* and cannot be directly addressed by MS-DOS–based programs without the aid of some special memory-managing software.

Table B-9 provides a map of the conventional memory area. When the microprocessor or a program addresses a location within the conventional memory range, it is physically addressing a location in main memory, which is the only main memory it can address under MS-DOS.

Table B-9. Conventional Memory Map

Address Range	Use
00000h–003FFh	Interrupt vector table
00400h–004FFh	BIOS data area
00500h–005FFh	MS-DOS and BASIC work area
00600h–0FFFFh	User memory
10000h–1FFFFh	User memory
20000h–2FFFFh	User memory
30000h–3FFFFh	User memory
40000h–4FFFFh	User memory
50000h–5FFFFh	User memory
60000h–6FFFFh	User memory
70000h–7FFFFh	User memory
80000h–8FFFFh	User memory
90000h–9FBFFh	User memory

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table B-10 provides a map of the upper memory area. Some of these addresses are dedicated to various system devices, such as the system BIOS. Others are available for use by expansion cards and/or an expanded memory manager (EMM). When the microprocessor or a program addresses a location within the upper memory area, it is physically addressing a location within one of these devices.

Table B-10. Upper Memory Map

Address Range	Use
0009FC00–0009FFFF	PS/2-mouse data area
000A0000–000BFFFF	Video RAM
000C0000–000C7FFF	Video BIOS
000C8000–000EFFFF	Available
000F0000–000FFFFF	System BIOS
00100000–0010FFEF	High memory area
0010FFF0–1FFFFFFF	Extended memory
20000000–FFFBFFFF	Reserved
FFFC0000–FFFFFFFF	BIOS ROM

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

A P P E N D I X   C

ISA Configuration Utility Messages

The ISA Configuration Utility (ICU) and its Configuration Manager are capable of iden-
tifying problems and alerting you to them. Both utilities can alert you to problems with
card configuration as well as problems that prevent proper operation of the utility. This
appendix describes each type of message and lists the possible causes and actions
you can take to resolve any problems indicated by a message. See the following
tables to locate your message and identify any possible corrective actions.

ICU Error Messages

The ICU can display a variety of error messages while in operation. These messages
alert you to problems that prevent the ICU from running correctly, as well as informing
you of resource conflicts that prevent the configuration of various cards in your com-
puter. If you receive a message from the ICU, see Table C-1 for suggestions on
resolving any problems indicated by the message.

Table C-1. Configuration Utility Messages

Message	Probable Cause	Corrective Action
`Out of memory` `Memory allocation failed`	Either of these messages can appear if the system runs out of memory during your operation.	Disable any terminate-and-stay-resident (TSR) programs or any unneeded device drivers.
`Not enough memory to run the ICU`	This message appears when you start the ICU if the system does not have enough memory to run the utility.	
`Can't open index file.` `This file is required for ICU to run.`	The ICU cannot find the index file for its database.	Make sure to switch to drive A before attempting to start the utility.

`No Configuration Manager.`	The device driver needed by the ICU is corrupted or is not correctly configured.	Verify that the following **device** statement appears in your **config.sys** file:
		
		`device=`*drive*`:\`*directory*`\driv-`
		`ers\dos\dwcfgmg.sys`
		
		In this statement, *drive* and *directory* represent the drive and directory where the driver resides. The default is `c:\plugplay`.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-1. Configuration Utility Messages *(continued)*

Message	Probable Cause	Corrective Action

`At least one Plug and Play card in your system is not configured due to conflicts. These are marked "config err" in the list of configured cards.`
 	
`Due to conflicts, the ICU could only configure some Plug and Play cards in your system. Unconfigured cards are marked "config err" in the list of configured cards.`
	The Configuration Manager or the ICU cannot configure at least one Plug and Play expansion card because of resource conflicts with one or more cards.	You must reconfigure the conflicting card(s). To find the conflicting card, perform the following steps:
		
		1. Select the Plug and Play expansion card marked with `config err`, and then click **Modify**.
		
		    The **Card Configuration** dialog box displays the functions assigned to the Plug and Play expansion card.
		
		2. Select a function and then click **Settings**. Click the **Cancel** button if the ICU does not display a message naming the conflicting card.
		
		3. Repeat step 2 until the ICU displays a message box naming the conflicting card and the resource(s) in conflict. See the following table entry for an explanation of this message box.

`This device is unconfigurable because of a resource conflict with card card_name. The conflicting resource is resource_name. To fix, reconfigure the conflicting card.`	You cannot configure the selected card because one of its resources is already being used by another device.	Perform the following procedure: 1. Make a note of the card name and the type of conflicting resource. 2. Follow the procedure in "Modifying a Card" in Chapter 4, and change the value for *resource_name* used by *card_name*.
`The ICU has successfully configured all Plug and Play cards in your system. For the new configuration to take effect, save the configuration, then reboot your system.`	The ICU has successfully configured all of the Plug and Play expansion cards that were not configured by the Configuration Manager.	To accept these settings, save the configuration information into NVRAM by selecting Exit from the File menu and then selecting Yes to save. You must reboot your system for these settings to take effect.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-1. Configuration Utility Messages (continued)

Message	Probable Cause	Corrective Action
`The loaded card is not a category card. Press OK to proceed.`	The category you have chosen is not the correct category under which to add this card.	Select **OK**. The ICU automatically opens the correct category's dialog box. Continue the procedure for adding the card as described in "Adding a Listed Card" or "Adding an Unlisted Card" in Chapter 4.

`No more DMA values can be added.`
 	
`No more interrupt values can be added.`
 	
`No more memory values can be added.`
 	
`No more I/O port values can be added.`
	No more values are available for the resource you are trying to add or modify.	The maximum number of values for each resource is as follows:
		
		• 4 DMA channels
		• 7 IRQ lines
		• 9 memory address blocks
		• 20 I/O ports
		
		To free values for the resource you are trying to add or modify, delete some of the values listed in the resource box for the card. If your card requires all of the values listed, contact your card manufacturer to resolve the issue.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-1. Configuration Utility Messages (continued)

Message	Probable Cause	Corrective Action

`The ICU detects`
`a resource conflict`
`between this card and`
`conflicting_card.The con-`
`flicting resource was:`
`resource.`
	You added or modified a card that now requires a *resource* value already in use by *conflicting_card*.	Try each of the following options until the problem is resolved:

- Modify the card you are adding so that it uses a different value for *resource*. See "Modifying a Card" in Chapter 4 for instructions.

- Modify `conflicting_card` so that it uses a different value for *resource*. See "Modifying a Card" in Chapter 4 for instructions.

- If `conflicting_card` is not the system board or riser board, remove it from the computer. See "Removing a Card" in Chapter 4 for instructions.

- Remove all expansion cards from the ICU, and then add them back one at a time, beginning with the new card and resolving resource conflicts as they arise. See "Removing a Card" and "Adding a Listed Card" or "Adding an Unlisted Card" in Chapter 4 for instructions.

- If you cannot resolve the resource conflict by any of the preceding methods, remove the new card. If you were modifying an existing card, reset the modified card to its previous resource value.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-1. Configuration Utility Messages (continued)

Message	Probable Cause	Corrective Action
The configuration (.cfg) file used by the ICU for this card is now invalid or does not exist. Do you wish to load the file? No configuration (.cfg) file exists for the card being modified. Do you want to load one?	This message appears when you try to add a listed card and the configuration file for this card has been corrupted or deleted from the database. This message appears when you modify a card and its configuration file does not exist or has been deleted.	You can get a copy of the configuration file from the original *ISA Configuration Utility Diskette* that you used to create the backup ICU diskette. Use the following procedure: 1. Insert the original *ISA Configuration Utility Diskette* into drive A. 2. Change to the db subdirectory on the diskette drive. 3. Use a text editor to search the icu.ndx file for the card ID of the card you want to add or modify. The name of the configuration file is part of this card ID. For example, if the card ID is ICU0200, the configuration file is **!icu0200.cfg**. 4. Copy the configuration file from the original ICU diskette to the backup diskette.
This is an EISA system. Use an ECU, not the ICU, to configure your system.	This message appears if you attempt to run the ICU on an EISA system.	To use the ICU, you must load the utility onto a non-EISA system.
You have added a card using settings different from factory default. Reconfigure the card to the settings in the next display (see the card's manual) before installing it.	This message can appear in two situations: • You added an ISA expansion card, selected **OK**, and the ICU had to use resource values different from the card's defaults to avoid conflicts. • You added an ISA expansion card, selected **Advanced**, and chose resource values different from the card's defaults.	Make a note of the new card configuration shown in the **Card Resource Usage** dialog box displayed after this message. Change jumper settings on the ISA expansion card to match the new card configuration.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Configuration Manager Messages

The Configuration Manager for the ICU identifies problems following the system boot routine and generates messages if necessary. These messages alert you to any unsuccessful attempts to configure Plug and Play or Peripheral Component Interconnect (PCI) expansion cards, as well as any problems that interfere with the operation of the Configuration Manager. If you receive a message from the Configuration Manager, see Table C-2 for suggestions on resolving any problems indicated by the message.

Table C-2. Configuration Manager Messages

Message	Probable Cause	Corrective Action
`Found Plug and Play ISA card:` *`Plug and Play ISA Card Name`*`.`	This message appears at system start-up for each Plug and Play ISA expansion card recognized by the Configuration Manager.	Status message; no action is required.
`NOTICE: Boot Device Not Active! CSN=`*`Card Select Number`*`.`	A boot device was found to be inactive.	Status message; no action is required. The Configuration Manager automatically configures and activates the device.
`One or more active devices have been reconfigured -- system requires reboot. Press any key to reboot system.`	You modified the resource values of one or more PCI or Plug and Play ISA expansion cards.	Reboot the system to reconfigure the card(s).

`The Plug and Play ISA card has been successfully configured.`
 	
`Card Count Plug and Play ISA cards have been successfully configured.`
	The Configuration Manager has successfully configured the given number of cards.	If this message does not match the number of Plug and Play ISA expansion cards installed in your computer, reinstall any Plug and Play expansion cards not listed and reboot the system.

`ERROR: Insufficient CM Memory`	There is not enough memory available to the Configuration Manager for it to run.	Disable any TSR programs or any unneeded device drivers.
`ERROR: Fatal BIOS error Internal Error Code.`	A BIOS call failed with an internal error. The most likely cause is an incompatibility between the BIOS and the Configuration Manager.	See the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* for instructions on obtaining technical assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-2. Configuration Manager Messages *(continued)*

Message	Probable Cause	Corrective Action
`ERROR: Could not read NVS, Error=Internal Error Code.`	An attempt to read the NVRAM failed.	See the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* for instructions on obtaining technical assistance.
`ERROR: Failed NVS write. Error=Internal Error Code.`	An attempt to write to NVRAM failed.	Run the Dell Diagnostics to verify the integrity of your system NVRAM. See the chapter titled "Running the Dell Diagnostics" in your *Diagnostics and Troubleshooting Guide* for instructions. If you are unable to determine the cause of the error, see the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* for instructions on obtaining technical assistance.

`ERROR: Failed to acti-vate device, CSN=Card Select Number.`	A Plug and Play expansion card could not be activated.	Use the following procedure:
		
		1. Exit the ICU and turn off your system.
		
		2. Remove the Plug and Play expansion card that could not be activated.
		
		    Follow steps 2 through 5 of "Removing an Expansion Card" in Chapter 8, and then return to this procedure.
		
		3. Reinstall the Plug and Play expansion card.
		
		    Follow steps 4 through 8 of "Installing an Expansion Card" in Chapter 8, and then return to this procedure.
		
		If you still receive the error message, contact the manufacturer of the Plug and Play expansion card for assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-2. Configuration Manager Messages (continued)

Message	Probable Cause	Corrective Action

`WARNING: Could not configure Plug and Play Card Name.`
 	
`WARNING: Could not configure PCI device, ID=DeviceID.`
 	
`Failed to configure Number of Total Count Plug and Play ISA devices. Use your system's configura- tion utility to resolve conflicts. Press any key to continue.`
	The card(s) mentioned are not fully configured due to resource conflicts.	If you have documentation that lists the allow- able resource values for your Plug and Play or PCI expansion card, you can use the following procedure to locate and resolve the resource conflict.
		
		NOTE: If you do not have documentation list- ing the allowable resource values, see the corrective action for these messages on the following page.
		
		1. Start the ICU.
		
		    Any Plug and Play or PCI expansion cards that could not be configured should be marked `config err` in the list of cards in the ICU window.
		
		2. Select the **System Resources** option from the **View** menu.
		
		    The **System Resource Usage** dialog box displays all resources currently used by the system.
		
		3. Select one of the resources used by your Plug and Play or PCI expansion card, and click the **Used By Card** button.
		
		    The **Card Resources Usage** dialog box identifies which device is using the resource.
		
		4. Repeat step 3 until you have identified all conflicting resources and the cards that use them.
		
		5. Modify the cards as needed to free the resources required by the unconfigured Plug and Play or PCI expansion card.
		
		    See "Modifying a Card" in Chapter 4 for instructions.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-2. Configuration Manager Messages (*continued*)

Message	Probable Cause	Corrective Action

`WARNING: Could not configure Plug and Play Card Name.`
 	
`WARNING: Could not configure PCI device, ID=DeviceID.`
 	
`Failed to configure Number of Total Count Plug and Play ISA devices. Use your system's configura-tion utility to resolve conflicts. Press any key to continue.`
	The card(s) mentioned are not fully configured due to resource conflicts.	If you do not know the allowable resource values for your Plug and Play or PCI expansion card, use the following procedure to locate and resolve the resource conflict:
		
		1. Remove all card configurations from the ICU.
		
		See "Removing a Card" in Chapter 4 for instructions.
		
		2. Reboot your system.
		
		The ICU should automatically configure your Plug and Play or PCI expansion card.
		
		3. Add the ISA expansion cards back into the ICU, resolving any resource conflicts as they arise.
		
		See "Adding a Listed Card" in Chapter 4 for instructions.
		
		If your Plug and Play or PCI expansion card is not automatically configured when you reboot the system with all other cards removed, you should contact the manufacturer of the card or see the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide*.

`WARNING: Boot Device conflict detected! CSN=Card Select Num-ber Error=Error.`	One of the devices is attempting to use one or more resources assigned to the system's boot device.	Perform the following procedure: 1. Start the ICU. 2. Identify the card marked `config err`. This card is attempting to use one or more resources required by the system's boot device. 3. Follow the procedure for the preceding error message in this table.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

APPENDIX D
Maintaining the System

Proper use of preventive maintenance procedures can keep the system in top operating condition and minimize the need for costly, time-consuming service procedures. This appendix contains maintenance procedures that you should perform regularly.

Data Preservation

Everyone inadvertently deletes files at one time or another. Also, hard-disk drives can fail after extended use, so it is not a question of *whether* you will eventually lose data, but *when*. To avoid such loss of data, you should regularly make backup copies of all hard-disk drive files. Frequent, regular backups are a must for anyone using a hard-disk drive.

Scheduling Backups

The frequency with which backups should be made depends on the amount of storage space on a hard-disk drive and the volatility of the data contained on the drive. Heavily used systems require more frequent backups than systems in which files are seldom changed.

Dell recommends that you back up the hard-disk drive at least once a week, with a daily backup of those files known to have been changed. Following these guidelines ensures the loss of no more than a day's work in the event of a hard-disk drive failure or if you inadvertently delete one or more important files.

As further insurance against data losses, you should keep duplicate copies of the weekly and monthly backups at an off-site location. Doing this ensures that you lose no more than a week's work, even if one of the on-site backups becomes corrupted.

Backup Devices

Iomega Zip drives are fast, convenient, and reliable devices that can back up data at rates of up to 11.2 megabytes per second (MB/sec) (sustained, without data compression) and can often run unattended. Dell offers Zip drives with storage capacities of 100 megabytes per Zip disk and recommends these drives and their associated backup software for use as system backup devices.

As a last resort, you can back up a hard-disk drive's contents on diskettes, a method that is both time-consuming and prone to human error. Also, backing up a full 4-GB hard-disk drive requires approximately 277 diskettes (when using 1.44-MB diskettes), 334 diskettes (when using 1.2-MB diskettes), or 139 diskettes (when using 2.88-MB diskettes). Therefore, if it is absolutely necessary to use diskettes as backup devices, any unwanted hard-disk drive files should be deleted before a backup procedure is started.

Recovering Data

Some hard-disk drive failures are recoverable. In these cases you may be able to recover all lost data if the proper utility software is available. Even losses such as accidentally deleted files or accidental reformatting of a hard-disk drive can be reversed with these utilities.

If the system is running MS-DOS, many apparent data loss problems are due to corruption or erasure of the hard-disk drive's master boot record (MBR), MS-DOS boot sector, or file allocation table (FAT); that is, accidental deletion of files or accidental reformatting of the hard-disk drive alters the MS-DOS boot sector, the FAT, and the root directory.

However, such accidents do not actually erase the contents of the hard-disk drive files until new data is written to the sectors containing these files. With software such as the Norton Utilities, Mace Utilities, or PC-Tools Deluxe, the data stored in these areas can often be restored, meaning that you can recover most, if not all, of the data.

Unlike using the **format** command on a hard-disk drive, using **format** on a diskette completely erases all the data on the diskette unless you use the diskette **format** program included in the Mace Utilities.

For a complete description of data recovery procedures and the software needed to perform them, see *The Paul Mace Guide to Data Recovery*, published by Brady.

Cleaning System Components

An exhaust fan in the power supply cools the power supply and system by drawing air in through various openings in the system and blowing it out the back. However, the fan also draws dust and other particles into the system, causing contaminant buildup, which results in an increase in the system's internal temperature and interferes with the operation of various system components.

To avoid these conditions, Dell recommends keeping your work environment clean to reduce the amount of dust and dirt around the system, thereby reducing the amount of contaminants drawn into the system by the power supply fan. In particular, you should keep the exterior of your system and monitor clean, and you should use a commercially available diskette-drive head-cleaning kit to remove contaminants inside your diskette drives.

Recommended Tools and Accessories

Dell recommends that you use the following tools and accessories when you clean the system:

- *A wrist-grounding strap* — The proper use of a wrist-grounding strap reduces the effect of electrostatic discharge (ESD), which can damage certain system components. To use a wrist-grounding strap, place the strap around your wrist and attach the other end of the strap to an unpainted metal surface in the chassis, such as the power supply bracket, that is connected to chassis ground.

- *A liquid dishwashing detergent* — Use a mixture of one part liquid dishwashing detergent and three parts water to clean the exterior of the system, monitor, and keyboard. You can also add fabric softener to produce an antistatic solution that prevents dust from being attracted to the monitor screen.

- *A soft, lint-free cleaning cloth* — Moisten the cleaning cloth with the dishwashing detergent solution to clean the exterior of the system.

- *A nonabrasive diskette-drive head-cleaning kit* — Dell recommends that you use a kit that contains pretreated diskettes in individually sealed packages. These kits ensure that the cleaning solution is applied evenly over the entire diskette-drive head surface, and they prevent contamination of the heads by exposure to foreign substances.

- *A small vacuum cleaner with a brush attachment* — Use the vacuum cleaner to remove dust and dirt from the exterior of the system and keyboard.

Cleaning the System, Monitor, and Keyboard Exteriors

A conventional monitor or keyboard cover minimizes the accumulation of dust and other debris inside the monitor and keyboard when they are not in use. Also, commercially available keyboard membrane covers make it possible to use the keyboard while providing protection against foreign particles.

However, regardless of any protective covers, the monitor and keyboard must be cleaned occasionally. To clean the exterior of the system, monitor, and keyboard, follow these steps:

1. Turn off the system, monitor, and any other attached peripherals, and disconnect them from their electrical outlets.

2. Use a vacuum cleaner to remove any dust from the slots and holes on the system and between the keys on the keyboard.

3. Moisten a soft cleaning cloth with a solution of three parts water and one part liquid dishwashing detergent.

    Do not soak the cloth in the solution; you must not let the solution drip inside the system or keyboard.

4. Use the moistened cloth to wipe the system cover, the keyboard, and the exterior of the monitor, including the screen.

Cleaning Drives

CAUTION: Do not attempt to clean drive heads with a swab. You may accidentally misalign the heads, rendering the drive inoperable.

You can clean the heads of your diskette drives by using a commercially available diskette-drive head-cleaning kit. These kits include diskettes pretreated with a chemical solution to nonabrasively remove contaminants that accumulate on the drive heads during normal operation.

If the kit does not contain instructions, insert one of the pretreated diskettes into a diskette drive and turn on the system. After 20 or 30 seconds, remove the diskette from the drive. Repeat this procedure for each diskette drive in the system.

Environmental Factors

This section discusses various environmental factors that can adversely affect system performance and longevity.

Temperature

Temperature extremes can cause a variety of problems, including premature aging and failure of chips or mechanical failure of devices. Extreme temperature fluctuations can cause chips to become loose in their sockets and can cause expansion and contraction of disk drive platters, resulting in read or write data errors. When you perform a low-level format operation on a hard-disk drive, it is important to ensure that the drive's surrounding temperature is at or near the temperature at which the drive will be operated. Failure to do so can result in relocation of the tracks on the disk platters.

To minimize the negative effects of temperature on system performance, follow these guidelines:

- Ensure that the system is operated in an environment no colder than 10° Celsius (C) (50° Fahrenheit [F]) or hotter than 35°C (95°F).

- Ensure that the system has adequate ventilation. Do not place it within a closed-in wall unit or on top of cloth material, which can act as insulation. Do not place it where it will receive direct sunlight, particularly in the afternoon. Do not place it next to a heat source of any kind, including heating vents during winter.

  Adequate ventilation is particularly important at high altitudes. System performance may not be optimum when the system is operating at high temperatures as well as high altitudes.

- Make sure that all slots and openings on the system remain unobstructed, especially the fan vent on the back of the system.

- Clean the system at regular intervals to avoid any buildup of dust and debris, which can cause a system to overheat.

- If the system has been exposed to abnormally cold temperatures, allow a two-hour warm-up period to bring it up to normal operating temperature before turning it on. Failure to do so may cause damage to internal components, particularly the hard-disk drive.

- If intermittent system failures are noticed, try reseating any socketed chips, which might have become loose due to temperature fluctuations.

Humidity

High-humidity conditions can cause moisture migration and penetration into the system. This moisture can cause corrosion of internal components and degradation of properties such as electrical resistance, thermal conductivity, physical strength, and size. Extreme moisture buildup inside the system can result in electrical shorts, which can cause serious damage to the system.

Each Dell system is rated to operate at 20 to 80 percent relative humidity, with a humidity gradation of 10 percent per hour. In storage, a Dell system can withstand from 5 to 95 percent relative humidity.

Buildings in which climate is controlled by air-conditioning in the warmer months and by heat during the colder months usually maintain an acceptable level of humidity for computer equipment. However, if a system is located in an unusually humid location, a dehumidifier can be used to maintain the humidity within an acceptable range.

Altitude

Operating a system at high altitude (low pressure) reduces the efficiency of forced and convection cooling and can result in electrical problems related to arcing and corona effects. This condition can also cause sealed components with internal pressure, such as electrolytic capacitors, to fail or perform at reduced efficiency.

Each Dell system is rated to operate at altitudes from –16 to 3048 meters (m) (–50 to 10,000 feet [ft]) and can be stored at altitudes of –16 to 10,600 m (–50 to 35,000 ft).

Dust and Particles

A clean operating environment can greatly reduce the negative effects of dust and other particles, which act as insulators and interfere with the operation of a system's mechanical components. Also, in addition to regular cleaning, you should follow these guidelines to deter contamination of the system equipment:

- Do not permit smoking anywhere near the system.

- Do not permit food or drink near the system.

- Use dust covers when the system is not in use.

- Keep all diskettes in a closed diskette box when not in use.

- Close windows and outside doors to keep out airborne particles.

Corrosion

The oil from a person's fingers or prolonged exposure to high temperature or humidity can corrode the gold-plated edge connectors and pin connectors on various devices in the system. This corrosion on system connectors is a gradual process that can eventually lead to intermittent failures of electrical circuits.

To prevent corrosion, you should avoid touching contacts on boards and cards. Protecting the system from corrosive elements is especially important in moist and salty environments, which tend to promote corrosion. Also, as a further deterrent to corrosion, the system should not be used in extreme temperatures, as explained in "Temperature" found earlier in this appendix.

ESD

ESD results from the buildup of static electricity on the human body and certain other objects. This static electricity is often produced by simple movements such as walking across a carpet. ESD is a discharge of a static electrical charge that occurs when a person whose body contains such a charge touches a component in the system. This static discharge can cause components, especially chips, to fail. ESD is a problem particularly in dry environments where the relative humidity is below 50 percent. To reduce the effects of ESD, you should observe the following guidelines:

- When working inside the system, wear a wrist-grounding strap. If a wrist-grounding strap is unavailable, touch an unpainted metal surface on the chassis periodically to neutralize any static charge.

- If at all possible, stand on a concrete floor while working inside the system.

- Use an antistatic floor mat when working inside the system.

- If it is necessary to work in a carpeted area, spray the carpet with an antistatic spray and allow it to dry before beginning to work inside the system.

- Keep components in their antistatic packaging until they are installed.

- Avoid wearing clothing made of wool or synthetic materials.

Electromagnetic and Radio Frequency Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) from a system can adversely affect devices such as radio and television (TV) receivers operating near the system. Radio frequencies emanating from a system can also interfere with cordless and low-power telephones. Conversely, RFI from high-power telephones can cause spurious characters to appear on the system's monitor screen.

RFI is defined as any EMI with a frequency above 10 kilohertz (kHz). This type of interference can travel from the system to other devices through the power cable and power source or through the air like transmitted radio waves. The Federal Communications Commission (FCC) publishes specific regulations to limit the amount of EMI and RFI emitted by computing equipment. Each Dell system meets these FCC regulations.

To reduce the possibility of EMI and RFI, follow these guidelines:

- Operate the system only with the system cover installed.

- Ensure that all expansion slots are covered either by a card-mounting bracket or by a metal filler bracket and that all drive bays have a drive and/or a metal insert installed. These brackets and metal inserts are available from Dell.

- Ensure that the screws on all peripheral cable connectors are securely fastened to their corresponding connectors on the back of the system.

- Always use shielded cables with metal connector shells for attaching peripherals to the system.

To prevent the possibility of RFI from a system affecting TV reception, follow these guidelines:

- Keep any TV set at least 6 ft away from the system.

- Use cable TV when possible.

- Use a directional outdoor TV antenna.

- Attach line filters to the TV set.

- Use 75-ohm coaxial cable for the TV set rather than twin-lead antenna wire.

- If interference occurs, rotate the system or the TV set 90 degrees.

Magnetism

Because they store data magnetically, diskettes and hard-disk drives are extremely susceptible to the effects of magnetism. Diskettes should never be stored near magnetic sources such as the following:

- Monitors

- TV sets

- Printers

- Telephones with real bells

- Fluorescent lights

Shock and Vibration

Excessive shock can damage the function, external appearance, and physical structure of a system. Each Dell system has been designed to operate properly after withstanding a minimum of six consecutively executed shock pulses in the positive and negative x, y, and z axes. Each shock pulse can measure up to 50 gravities (G) (half-sine wave) for up to 2 milliseconds (ms). In storage, the system can withstand shock pulses of 110 G (half-sine wave) for 2 ms or 27 G (square wave) for 15 ms.

Excessive vibration can cause the same problems as mentioned earlier for shock, as well as cause components to become loose in their sockets or connectors. Systems can be subject to significant vibration when being transported by vehicle or when operated in an environment with machinery that causes vibration.

Each Dell system, when operating, is designed to withstand 0.25 G (half-sine wave) at a sweep of 3 to 200 hertz (Hz) for 30 minutes. In storage, the system can withstand 0.5 G at 3 to 200 Hz for 30 minutes.

Power Source Interruptions

Systems are especially sensitive to variations in voltage supplied by the AC power source. Over-voltage, undervoltage, and transients (or *spikes*) can erase data from memory or even cause components to fail. To protect against these types of problems, power cables should always be properly grounded and one or both of the following methods should be used:

- Use one of the power protection devices described in the following section, "Power Protection Devices."

- Place the system on a dedicated power circuit (rather than sharing a circuit with other heavy electrical equipment). In general, do not allow the system to share a circuit with any of the following:

    — Copier machines

    — Air conditioners

    — Vacuum cleaners

    — Space heaters

    — Power tools

    — Teletype machines

    — Adding machines

    — Laser printers

    — Facsimile machines

    — Any other motorized equipment

Besides these appliances, the greatest threats to a system's supply of power are surges or blackouts caused by electrical storms. Whenever possible, turn off the system and any peripherals and unplug them from their power sources during thunderstorms.

If a blackout occurs—even a temporary one—while the system is turned on, turn off the system immediately and disconnect it from the electrical outlet. Leaving the system on may cause problems when the power is restored; all other appliances left on in the area can create large voltage spikes that can damage the system.

Power Protection Devices

A number of devices are available that protect against power problems such as power surges, transients, and power failures. The following subsections describe some of these devices.

Surge Protectors

Surge protectors are available in a variety of types and usually provide a level of protection commensurate with the cost of the device. Surge protectors prevent voltage spikes, such as those caused during an electrical storm, from entering a system through the electrical outlet. Surge protectors, however, do not offer protection against brownouts, which occur when the voltage drops more than 20 percent below the normal AC line voltage level.

Line Conditioners

Line conditioners go beyond the overvoltage protection of surge protectors. Line conditioners keep a system's AC power source voltage at a fairly constant level and, therefore, can handle brownouts. Because of this added protection, line conditioners cost more than surge protectors—up to several hundred dollars. However, these devices cannot protect against a complete loss of power.

Uninterruptible Power Supplies

Uninterruptible power supply (UPS) systems offer the most complete protection against variations in power because they use battery power to keep the system running when AC power is lost. The battery is charged by the AC power while it is available, so once AC power is lost, the battery can provide power to the system for a limited amount of time—from 15 minutes to an hour or so—depending on the UPS system.

UPS systems range in price from a few hundred dollars to several thousand dollars, with the more expensive units allowing you to run larger systems for a longer period of time when AC power is lost. UPS systems that provide only 5 minutes of battery power let you conduct an orderly shutdown of the system, but are not intended to provide continued operation. Surge protectors should be used with all UPS systems, and the UPS system should be Underwriters Laboratories (UL) safety-approved.

APPENDIX E
Regulatory Notices

Electromagnetic Interference (EMI) is any signal or emission, radiated in free space or conducted along power or signal leads, that endangers the functioning of a radio navigation or other safety service or seriously degrades, obstructs, or repeatedly interrupts a licensed radio communications service. Radio communications services include but are not limited to AM/FM commercial broadcast, television, cellular services, radar, air-traffic control, pager, and Personal Communication Services (PCS). These licensed services, along with unintentional radiators such as digital devices, including computer systems, contribute to the electromagnetic environment.

Electromagnetic Compatibility (EMC) is the ability of items of electronic equipment to function properly together in the electronic environment. While this computer system has been designed and determined to be compliant with regulatory agency limits for EMI, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference with radio communications services, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, consult a Regulatory EMC representative of Dell Computer Corporation or an experienced radio/television technician for additional suggestions. You may find the *FCC Interference Handbook, 1986*, to be helpful. It is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00450-7 or on the World Wide Web at **http://www.fcc.gov/Bureaus/Compliance/WWW/tvibook.html**.

Dell computer systems are designed, tested, and classified for their intended electromagnetic environment. These electromagnetic environment classifications generally refer to the following harmonized definitions:

- Class A is for business or industrial environments.
- Class B is for residential environments.

Information Technology Equipment (ITE), including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, that are integrated into or connected to the system should match the electromagnetic environment classification of the computer system.

A Notice About Shielded Signal Cables: Use only shielded cables for connecting peripherals to any Dell device to reduce the possibility of interference with radio communications services. Using shielded cables ensures that you maintain the appropriate EMC classification for the intended environment. For parallel printers, a cable is available from Dell Computer Corporation. If you prefer, you can order a cable from Dell Computer Corporation on the World Wide Web at http://www.dell.com/products/dellware/index.htm.

A Notice About Networked Computer Systems: Some Dell computer systems that are classified for Class B environments may include an on-board network interface controller (NIC). If your Class B system contains a NIC, it may be considered to be a Class A system at the time that the NIC is connected to a network. When the NIC is not connected to a network, your system is considered to be a Class B digital device.

Most Dell computer systems are classified for Class B environments. To determine the electromagnetic classification for your system or device, refer to the following sections specific for each regulatory agency. Each section provides country-specific EMC/EMI or product safety information.

FCC Notices (U.S. Only)

Most Dell computer systems are classified by the Federal Communications Commission (FCC) as Class B digital devices. However, the inclusion of certain options can change the rating of some configurations to Class A. To determine which classification applies to your computer system, examine all FCC registration labels located on the bottom or back panel of your computer, on card-mounting brackets, and on the cards themselves. If any one of the labels carries a Class A rating, your entire system is considered to be a Class A digital device. If *all* labels carry either the Class B rating distinguished by either an FCC ID number or the FCC logo, (**FC**), your system is considered to be a Class B digital device.

Once you have determined your system's FCC classification, read the appropriate FCC notice. Note that FCC regulations provide that changes or modifications not expressly approved by Dell Computer Corporation could void your authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Class A

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

Class B

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

If necessary, consult a representative of Dell Computer Corporation or an experienced radio/television technician for additional suggestions. You may find the following booklet helpful: *FCC Interference Handbook, 1986*, available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00450-7.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

The following information is provided on the device or devices covered in this document in compliance with FCC regulations:

- Product name: Dell Precision 210
- Model number: WCM

- Company name: Dell Computer Corporation
  Regulatory Department
  One Dell Way
  Round Rock, Texas 78682 USA
  512-338-4400

IC Notice (Canada Only)

Most Dell computer systems (and other Dell digital apparatus) are classified by the Industry Canada (IC) Interference-Causing Equipment Standard #3 (ICES-003) as Class B digital devices. To determine which classification (Class A or B) applies to your computer system (or other Dell digital apparatus), examine all registration labels located on the bottom or the back panel of your computer (or other digital apparatus). A statement in the form of "IC Class A ICES-3" or "IC Class B ICES-3" will be located on one of these labels. Note that Industry Canada regulations provide that changes or modifications not expressly approved by Dell Computer Corporation could void your authority to operate this equipment.

> This Class B (or Class A, if so indicated on the registration label) digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.
>
> Cet appareil numérique de la Classe B (ou Classe A, si ainsi indiqué sur l'étiquette d'enregistrement) respecte toutes les exigences du Reglement sur le Materiel Brouilleur du Canada.

CE Notice (European Union)

Marking by the symbol **CE** indicates compliance of this Dell system to the EMC Directive and the Low Voltage Directive of the European Union. Such marking is indicative that this Dell system meets the following technical standards:

- EN 55022 — "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."

- EN 50082-1: 1992 — "Electromagnetic compatibility—Generic immunity standard Part 1: Residential, commercial, and light industry."

- EN 60950 — "Safety of Information Technology Equipment."

NOTE: EN 55022 emissions requirements provide for two classifications:

- Class A is for typical commercial areas.

- Class B is for typical domestic areas.

WARNING: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

EN 55022 Compliance (Czech Republic Only)

This device belongs to Class B devices as described in EN 55022, unless it is specifically stated that it is a Class A device on the specification label. The following applies to devices in Class A of EN 55022 (radius of protection up to 30 meters). The user of the device is obliged to take all steps necessary to remove sources of interference to telecommunication or other devices.

Pokud není na typovém štitku počítače uvedeno, že spadá do třídy A podle EN 55022, spadá automaticky do třídy B podle EN 55022. Pro zařízení zařazená do třídy A (ochranné pásmo 30m) podle EN 55022 platí následující. Dojde-li k rušení telekomunikačních nebo jinych zařízení, je uživatel povinen provést taková opatření, aby rušení odstranil.

VCCI Notice (Japan Only)

Most Dell computer systems are classified by the Voluntary Control Council for Interference (VCCI) as Class B information technology equipment (ITE). However, the inclusion of certain options can change the rating of some configurations to Class A. ITE, including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, integrated into or connected to the system, should match the electromagnetic environment classification (Class A or B) of the computer system.

To determine which classification applies to your computer system, examine the regulatory labels/markings (see Figures E-1 and E-2) located on the bottom or back panel of your computer. Once you have determined your system's VCCI classification, read the appropriate VCCI notice.

Class A ITE

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

VCCI-A

Figure E-1. VCCI Class A ITE Regulatory Mark

Class B ITE

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス B 情報技術装置です。この装置は家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用させると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをして下さい。

This is a Class B product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

Figure E-2. VCCI Class B ITE Regulatory Mark

Polish Center for Testing and Certification Notice

The equipment should draw power from a socket with an attached protection circuit (a three-prong socket). All equipment that works together (computer, monitor, printer, and so on) should have the same power supply source.

The phasing conductor of the room's electrical installation should have a reserve short-circuit protection device in the form of a fuse with a nominal value no larger than 16 amperes (A).

To completely switch off the equipment, the power supply cable must be removed from the power supply socket, which should be located near the equipment and easily accessible.

A protection mark "B" confirms that the equipment is in compliance with the protection usage requirements of standards PN-93/T-42107 and PN-89/E-06251.

Wymagania Polskiego Centrum Badań i Certyfikacji

Urządzenie powinno być zasilane z gniazda z przyłączonym obwodem ochronnym (gniazdo z kołkiem). Współpracujące ze sobą urządzenia (komputer, monitor, drukarka) powinny być zasilane z tego samego źródła.

Instalacja elektryczna pomieszczenia powinna zawierać w przewodzie fazowym rezerwową ochronę przed zwarciami, w postaci bezpiecznika o wartości znamionowej nie większej niż 16A (amperów).

W celu całkowitego wyłączenia urządzenia z sieci zasilania, należy wyjąć wtyczkę kabla zasilającego z gniazdka, które powinno znajdować się w pobliżu urządzenia i być łatwo dostępne.

Znak bezpieczeństwa "B" potwierdza zgodność urządzenia z wymaganiami bezpieczeństwa użytkowania zawartymi w PN-93/T-42107 i PN-89/E-06251.

Pozostałe instrukcje bezpieczeństwa

- Nie należy używać wtyczek adapterowych lub usuwać kołka obwodu ochronnego z wtyczki. Jeżeli konieczne jest użycie przedłużacza to należy użyć przedłużacza 3-żyłowego z prawidłowo połączonym przewodem ochronnym.

- System komputerowy należy zabezpieczyć przed nagłymi, chwilowymi wzrostami lub spadkami napięcia, używając eliminatora przepięć, urządzenia dopasowującego lub bezzakłóceniowego źródła zasilania.

- Należy upewnić się, aby nic nie leżało na kablach systemu komputerowego, oraz aby kable nie były umieszczone w miejscu, gdzie można byłoby na nie nadeptywać lub potykać się o nie.

- Nie należy rozlewać napojów ani innych płynów na system komputerowy.

- Nie należy wpychać żadnych przedmiotów do otworów systemu komputerowego, gdyż może to spowodować pożar lub porażenie prądem, poprzez zwarcie elementów wewnętrznych.

- System komputerowy powinien znajdować się z dala od grzejników i źródeł ciepła. Ponadto, nie należy blokować otworów wentylacyjnych. Należy unikać kładzenia luźnych papierów pod komputer oraz umieszczania komputera w ciasnym miejscu bez możliwości cyrkulacji powietrza wokół niego

NOM Information (Mexico Only)

The following information is provided on the device(s) described in this document in compliance with the requirements of the official Mexican standards (NOM)

Exporter:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
Importer:	Dell Computer de México, S.A. de C.V. Rio Lerma No. 302 - 4° Piso Col. Cuauhtemoc 16500 México, D.F.

Ship to:	Dell Computer de México,
	  S.A. de C.V. al Cuidado
	  de Kuehne & Nagel de
	  México S. de R.I.
	Avenida Soles No. 55
	Col. Peñon de los Baños
	15520 México, D.F.

Supply voltage:	115/230 VAC
Frequency:	60/50 Hz
Current consumption:	6.0/3.0 A

Información para NOM
(únicamente para México)

La información siguiente se proporciona en el dispositivo o en los dispositivos descritos en este documento, en cumplimiento con los requisitos de la Norma Oficial Mexicana (NOM):

Exportador:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
Importador:	Dell Computer de México, S.A. de C.V. Rio Lerma No. 302 - 4° Piso Col. Cuauhtemoc 16500 México, D.F.

Embarcar a:	Dell Computer de México,
	  S.A. de C.V. al Cuidado
	  de Kuehne & Nagel de
	  México S. de R.I.
	Avenida Soles No. 55
	Col. Peñon de los Baños
	15520 México, D.F.

Tensión alimentación:	115/230 VAC
Frecuencia:	60/50 Hz
Consumo de corriente:	6.0/3.0 A

*B*CIQ Notice (Taiwan Only)

警告使用者：這是甲類的資訊產品，在居住的環境中使用時，可能會造成無線電干擾，在這種情況下，使用者會被要求採取某些適當的對策。

APPENDIX F

Warranty, Return Policy, and Year 2000 Statement of Compliance

Limited Three-Year Warranty (U.S. and Canada Only)

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. Dell warrants that the hardware products it manufactures will be free from defects in materials and workmanship. The warranty term is three years beginning on the date of invoice, as described in the following text.

Damage due to shipping the products to you is covered under this warranty. Otherwise, this warranty does not cover damage due to external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorized by Dell, usage not in accordance with product instructions, failure to perform required preventive maintenance, and problems caused by use of parts and components not supplied by Dell.

This warranty does not cover any items that are in one or more of the following categories: software; external devices (except as specifically noted); accessories or parts added to a Dell system after the system is shipped from Dell; accessories or parts added to a Dell system through Dell's system integration department; accessories or parts that are not installed in the Dell factory; or DellWare® products. Monitors, keyboards, and mice that are Dell-branded or that are included on Dell's standard price list are covered under this warranty; all other monitors, keyboards, and mice (including those sold through the DellWare program) are not covered. Batteries for portable computers are covered only during the initial one-year period of this warranty.

Coverage During Year One

During the one-year period beginning on the invoice date, Dell will repair or replace products covered under this limited warranty that are returned to Dell's facility. To request warranty service, you must call Dell's Customer Technical Support within the warranty period. Refer to the chapter titled "Getting Help" in your system's troubleshooting documentation or, for some systems, the section titled "Contacting Dell: in your system's online guide to find the appropriate telephone number for obtaining customer assistance. If warranty service is required, Dell will issue a Return Material

Authorization Number. You must ship the products back to Dell in their original or equivalent packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. Dell will ship the repaired or replacement products to you freight prepaid if you use an address in the continental U.S. or Canada, where applicable. Shipments to other locations will be made freight collect.

NOTE: Before you ship the product(s) to Dell, back up the data on the hard-disk drive(s) and any other storage device(s) in the product(s). Remove any removable media, such as diskettes, CDs, or PC Cards. Dell does not accept liability for lost data or software.

Dell owns all parts removed from repaired products. Dell uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If Dell repairs or replaces a product, its warranty term is not extended.

Coverage During Years Two and Three

During the second and third years of this limited warranty, Dell will provide, on an exchange basis and subject to Dell's Exchange Policy in effect on the date of the exchange, replacement parts for the Dell hardware product(s) covered under this limited warranty when a part requires replacement. You must report each instance of hardware failure to Dell's Customer Technical Support in advance to obtain Dell's concurrence that a part should be replaced and to have Dell ship the replacement part. Dell will ship parts (freight prepaid) if you use an address in the continental U.S. or Canada, where applicable. Shipments to other locations will be made freight collect. Dell will include a prepaid shipping container with each replacement part for your use in returning the replaced part to Dell. Replacement parts are new or reconditioned. Dell may provide replacement parts made by various manufacturers when supplying parts to you. The warranty term for a replacement part is the remainder of the limited warranty term.

You will pay Dell for replacement parts if the replaced part is not returned to Dell. The process for returning replaced parts, and your obligation to pay for replacement parts if you do not return the replaced parts to Dell, will be in accordance with Dell's Exchange Policy in effect on the date of the exchange.

You accept full responsibility for your software and data. Dell is not required to advise or remind you of appropriate backup and other procedures.

General Provisions

DELL MAKES NO EXPRESS WARRANTIES OR CONDITIONS BEYOND THOSE STATED IN THIS WARRANTY STATEMENT. DELL DISCLAIMS ALL OTHER WARRANTIES AND CONDITIONS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES OR CONDITIONS, SO THIS LIMITATION MAY NOT APPLY TO YOU.

DELL'S RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN HARDWARE IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS WARRANTY STATEMENT. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE (OR JURIS-DICTION TO JURISDICTION).

DELL DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS WARRANTY STATEMENT OR LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW THE EXCLUSION OR LIMITA-TION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

These provisions apply to Dell's limited three-year warranty only. For provisions of any service contract covering your system, refer to your invoice or the separate service contract that you will receive.

If Dell elects to exchange a system or component, the exchange will be made in accordance with Dell's Exchange Policy in effect on the date of the exchange. In any instance in which Dell issues a Return Materials Authorization Number, Dell must receive the product(s) for repair prior to the expiration of the warranty period in order for the repair(s) to be covered by the warranty.

NOTE: If you chose one of the available warranty and service options in place of the standard limited three-year warranty described in the preceding text, the option you chose will be listed on your invoice.

"Total Satisfaction" Return Policy (U.S. and Canada Only)

If you are an end-user customer who bought new products directly from a Dell com-pany, you may return them to Dell within 30 days of the date of invoice for a refund or credit of the product purchase price. If you are an end-user customer who bought reconditioned or refurbished products from a Dell company, you may return them to Dell within 14 days of the date of invoice for a refund or credit of the product purchase price. In either case, the refund or credit will not include any shipping and handling charges shown on your invoice. If you are an organization that bought the products under a written agreement with Dell, the agreement may contain different terms for the return of products than specified by this policy.

To return products, you must call Dell Customer Service to receive a Credit Return Authorization Number. Refer to the chapter titled "Getting Help" in your system's troubleshooting documentation or, for some systems, the section titled "Contacting Dell" in your system's online guide to find the appropriate telephone number for obtaining customer assistance. To expedite the processing of your refund or credit, Dell expects you to return the products to Dell in their original packaging within five days of the date that Dell issues the Credit Return Authorization Number. You must also prepay shipping charges and insure the shipment or accept the risk of loss or

damage during shipment. You may return software for refund or credit only if the sealed package containing the diskette(s) or CD(s) is unopened. Returned products must be in as-new condition, and all of the manuals, diskette(s), CD(s), power cables, and other items included with a product must be returned with it. For customers who want to return, for refund or credit only, either applications software or an operating system that has been installed by Dell, the whole system must be returned, along with any media and documentation that may have been included in the original shipment.

This "Total Satisfaction" Return Policy does not apply to DellWare products, which may be returned under DellWare's then-current return policy. In addition, reconditioned parts purchased through Dell Spare Parts Sales in Canada are nonreturnable.

Year 2000 Statement of Compliance for Dell-Branded Hardware Products

Dell-branded hardware products shipped on or after January 1, 1997, are eligible to carry the "NSTL Hardware Tested Year 2000 Compliant" logo by virtue of formal testing with, and successful completion of, the National Software Testing Laboratories (NSTL) YMARK2000 test.* Dell will treat a failure to pass the YMARK2000 test as a covered event under Dell's warranty for the product, subject to the normal warranty limitations.** For a complete copy of Dell's warranty, see the product's documentation. Dell-branded hardware products will also recognize the year 2000 as a leap year.

*The YMARK2000 standard tests the ability of system hardware and firmware to support the transition to the year 2000 (and to recognize leap years, when appropriate, for years 2000 through 2009 inclusive) and not that of options, operating systems, or applications software. Dell-branded hardware products that pass the YMARK2000 test conform to BSI-DISC PD 2000-1.

** Except for this clarification of Dell's warranty for NSTL logo hardware, all other warranties, conditions and remedies, express or implied, relating to year 2000 readiness or compliance are disclaimed. To make a claim under this warranty for NSTL logo hardware, customers must contact Dell prior to January 1, 2001. Despite a system's ability to pass the YMARK2000 test, actual rollover results in specific operating environments may vary depending on other factors including, but not limited to, other hardware, operating systems, and applications software.

Previous Products

For Dell-branded hardware products shipped prior to January 1, 1997, that have an upgradable basic input/output system (BIOS), Dell makes available a BIOS upgrade. Although these products may not have been tested under the YMARK2000 test, Dell believes that the hardware would pass the YMARK2000 test, provided the appropriate BIOS upgrade is properly loaded.

For Dell-branded hardware products that do not have an upgradable BIOS, Dell has made available, as a convenience to customers, the Dell Program Patch, a software utility designed to assist customers in managing the year 2000 rollover.

Software

Dell specifically excludes all non-Dell-developed software from this compliance state-
ment. All software run on Dell-branded hardware products should be independently
verified by customers to be year 2000-compliant.

Additional Information

For additional information on year 2000 compliance of Dell-branded hardware prod-
ucts, refer to Dell's Year 2000 Web site at **www.dell.com/year2000** or contact a Dell
customer service representative in your area.

Glossary

The following list defines or identifies technical terms, abbreviations, and acronyms used in Dell® user documents.

NOTE: Unless otherwise specified, these definitions may not apply to operating systems other than Microsoft® Windows® 95 and Windows NT ®.

A
Abbreviation for ampere(s).

AC
Abbreviation for alternating current.

ACPI
Abbreviation for Advanced Configuration and Power Interface. ACPI enables operating-system-directed power management rather than system BIOS-directed power management. In addition, it provides a generic system event mechanism for Plug and Play and an interface for configuration control.

adapter card
An expansion card that plugs into an expansion-card connector on the computer's system board. An adapter card adds some specialized function to the computer by providing an interface between the expansion bus and a peripheral device. Examples of adapter cards include network cards, and sound cards.

ADI
Abbreviation for Autodesk Device Interface.

AGP
Abbreviation for accelerated graphics port. AGP is a dedicated graphics port that provides a faster interface between the video subsystem and system memory than a PCI graphics device and allows conventional memory to be used for video-related tasks. The improved interface enables AGP to deliver a smooth, true-color video image.

application program
Software, such as a spreadsheet or word processor, designed to help you perform a specific task or series of tasks. Application programs run from the operating system.

ASCII
Acronym for American Standard Code for Information Interchange. A text file containing only characters from the ASCII character set (usually created with a text editor, such as Notepad in Windows), is called an ASCII file.

ASIC
Acronym for application-specific integrated circuit.

asset tag code
An individual code assigned to a computer, usually by a system administrator, for security or tracking purposes.

attribute
As it relates to DMI, an attribute is a piece of information related to a component. Attributes can be combined to form groups. If an attribute is defined as

read-write, it may be defined by a management application.

autoexec.bat *file*

The **autoexec.bat** file (Windows 95 and MS-DOS only) is executed when you boot your computer (after executing any commands in the **config.sys** file). This start-up file contains commands that define the characteristics of each device connected to your computer, and it finds and executes programs stored in locations other than the active directory.

backup

A copy of a program or data file. As a precaution, you should back up your computer's hard-disk drive on a regular basis. Before making a change to the configuration of your computer, you should back up important start-up files from your operating system.

backup battery

The backup battery maintains system configuration, date, and time information in a special section of memory when the system is turned off.

base memory

Synonym for conventional memory. See also **conventional memory**.

batch file

An ASCII text file containing a list of commands that run in sequence. Instead of typing each command, you need only type the batch filename. The system executes the commands as if you had typed each one individually. Both files must have a filename extension of **bat**.

baud rate

A measurement of data transmission speed. For example, modems are designed to transmit data at one or more specified baud rate(s) through the COM (serial) port of a computer.

BBS

Abbreviation for bulletin board service. A computer system that serves as a central location for accessing data or relaying messages by modem. For example, Dell's TechConnect BBS contains the latest

version of software, such as video drivers. If your system has a modem, you can access the BBS and download the most recent version of this software.

beep code

A diagnostic message in the form of a pattern of beeps from your computer's speaker. For example, one beep, followed by a second beep, and then a burst of three beeps is beep code 1-1-3.

binary

A base-2 numbering system that uses 0 and 1 to represent information. The computer performs operations based on the ordering and calculation of these numbers.

BIOS

Acronym for basic input/output system. Your computer's BIOS contains programs stored on a flash memory chip. The BIOS controls the following:

- Communications between the microprocessor and peripheral devices, such as the keyboard and the video adapter

- Miscellaneous functions, such as system messages

bit

The smallest unit of information interpreted by your computer.

boot routine

When you start your computer, it clears all memory, initializes devices, and loads the operating system. Unless the operating system fails to respond, you can reboot (also called *warm boot*) your computer by pressing <Ctrl><Alt><Del>; otherwise, you must perform a cold boot by pressing the reset button or by turning the computer off and then back on.

bootable diskette

A diskette that can boot your computer to the operating system in the event that the computer will not boot from the hard-disk drive.

bpi

Abbreviation for bits per inch.

bps

Abbreviation for bits per second.

BTU

Abbreviation for British thermal unit.

bus

An information pathway between the components of a computer. Your computer contains an expansion bus that allows the microprocessor to communicate with controllers for all the various peripheral devices connected to the computer. Your computer also contains an address bus and a data bus for communications between the microprocessor and RAM.

byte

Eight contiguous bits of information, the basic data unit used by your computer.

C

Abbreviation for Celsius.

cache

A fast storage area that keeps a copy of data or instructions for quicker data retrieval. For example, your computer's BIOS may cache ROM code in faster RAM. Or, a disk-cache utility may reserve RAM in which to store frequently accessed information from your computer's disk drives; when a program makes a request to a disk drive for data that is in the cache, the disk-cache utility can retrieve the data from RAM faster than from the disk drive.

card-edge connector

The metal-contact section on the bottom of an expansion card that plugs into an expansion-card connector.

CD-ROM

Abbreviation for compact disc read-only memory. CD-ROM drives use optical technology to read data from CDs. CDs are read-only storage devices; you cannot write new data to a CD with standard CD-ROM drives.

cm

Abbreviation for centimeter(s).

CMOS

Acronym for complementary metal-oxide semiconductor. In computers, CMOS memory chips are often used for NVRAM storage.

COM n

The device names for the first through fourth serial ports on your computer are COM1, COM2, COM3, and COM4. The default interrupt for COM1 and COM3 is IRQ4, and the default interrupt for COM2 and COM4 is IRQ3. Therefore, you must be careful when configuring software that runs a serial device so that you don't create an interrupt conflict.

component

As they relate to DMI, manageable components are operating systems, computer systems, expansion cards, or peripherals that are compatible with DMI. Each component is made up of groups and attributes that are defined as relevant to that component.

config.sys file

The **config.sys** file (Windows 95 and MS-DOS only) is executed when you boot your computer (before running any commands in the **autoexec.bat** file). This start-up file contains commands that specify which devices to install and which drivers to use. This file also contains commands that determine how the operating system uses memory and controls files.

controller

A chip that controls the transfer of data between the microprocessor and memory or between the microprocessor and a peripheral device such as a disk drive or the keyboard.

control panel

The part of the computer that contains indicators and controls, such as the power switch, hard-disk drive access indicator, and power indicator.

conventional memory
The first 640 KB of RAM. Conventional memory is found in all computers. Unless they are specially designed, MS-DOS® programs are limited to running in conventional memory.

coprocessor
A chip that relieves the computer's microprocessor of specific processing tasks. A math coprocessor, for example, handles numeric processing. A graphics coprocessor handles video rendering. The Intel® Pentium® microprocessor, for example, includes a built-in math coprocessor.

cpi
Abbreviation for characters per inch.

CPU
Abbreviation for central processing unit. See also **microprocessor**.

cursor
A marker, such as a block, underscore, or pointer that represents the position at which the next keyboard or mouse action will occur.

DAT
Acronym for digital audio tape.

dB
Abbreviation for decibel(s).

dBA
Abbreviation for adjusted decibel(s).

DC
Abbreviation for direct current.

Dell Diagnostics
A comprehensive set of diagnostic tests for your Dell computer. To use the diagnostics, you must boot your computer from the *Dell Diagnostics Diskette*. Refer to your *Diagnostics and Troubleshooting Guide* for more information about using the Dell Diagnostics.

Dell Inspector
A DMI browser that allows you to view your computer system's current hardware configuration and operating system

version. If your system includes Dell-installed software, you can select this program from the Dell Accessories program folder.

device driver
A program that allows the operating system or some other program to interface correctly with a peripheral device, such as a printer. Most device drivers are installed when the operating system is installed.

DIMM
Acronym for dual in-line memory module. A small circuit board containing DRAM chips that connects to the system board.

DIN
Acronym for *Deutsche Industrie Norm*.

DIP
Acronym for dual in-line package. A circuit board, such as a system board or expansion card, may contain DIP switches for configuring the circuit board. DIP switches are always toggle switches, with an ON position and an OFF position.

directory
Directories help keep related files organized on a disk in a hierarchical, "inverted tree" structure. Each disk has a "root" directory; for example, a `C:\>` prompt normally indicates that you are at the root directory of hard-disk drive C. Additional directories that branch off of the root directory are called *subdirectories*. Subdirectories may contain additional directories branching off of them.

display adapter
See **video adapter**.

DMA
Abbreviation for direct memory access. A DMA channel allows certain types of data transfer between RAM and a device to bypass the microprocessor.

DMI
Abbreviation for Desktop Management Interface. DMI enables the management of your computer system's software and

hardware. DMI collects information about the system's components, such as the operating system, memory, peripherals, expansion cards, and asset tag. Information about the system's components is displayed as a MIF file or through the Dell Inspector program.

DMTF

Abbreviation for Desktop Management Task Force, a consortium of companies representing hardware and software providers, of which Dell Computer Corporation is a member.

dpi

Abbreviation for dots per inch.

DPMS

Abbreviation for Display Power Management Signaling. A standard developed by the Video Electronics Standards Association (VESA®) that defines the hardware signals sent by a video controller to activate power management states in a monitor. A monitor is said to be DPMS-compliant when it is designed to enter a power management state after receiving the appropriate signal from a computer's video controller.

DRAM

Abbreviation for dynamic random-access memory. A computer's RAM is usually made up entirely of DRAM chips. Because DRAM chips cannot store an electrical charge indefinitely, your computer continually refreshes each DRAM chip in the computer.

drive-type number

Your computer can recognize a number of specific hard-disk drives. Each is assigned a drive-type number that is stored in NVRAM. The hard-disk drive(s) specified in your computer's System Setup program must match the actual drive(s) installed in the computer. The System Setup program also allows you to specify physical parameters (logical cylinders, logical heads, cylinder number, and logical sectors per pack) for drives not included in the table of drive types stored in NVRAM.

DSP

Abbreviation for digital signal processing.

DTE

Abbreviation for data terminal equipment. Any device, such as a computer system, that can send data in digital form by means of a cable or communications line. The DTE is connected to the cable or communications line through a data communications equipment (DCE) device, such as a modem.

ECC

Abbreviation for error checking and correction.

ECP

Abbreviation for Extended Capabilities Port.

EEPROM

Acronym for electrically erasable programmable read-only memory.

EIDE

Abbreviation for enhanced integrated drive electronics. EIDE devices add one or more of the following enhancements to the traditional IDE standard:

- Data transfer rates of up to 16 MB/sec

- Support for drives other than just hard-disk drives, such as CD-ROM and tape drives

- Support for hard-disk drives with capacities greater than 528 MB

- Support for up to two controllers, each with up to two devices attached

EISA

Acronym for Extended Industry-Standard Architecture, a 32-bit expansion-bus design. The expansion-card connectors in an EISA computer are also compatible with 8- or 16-bit ISA expansion cards.

To avoid a configuration conflict when installing an EISA expansion card, you must use the EISA Configuration Utility. This utility allows you to specify which

expansion slot contains the card and obtains information about the card's required system resources from a corresponding EISA configuration file.

EMC
Abbreviation for Electromagnetic Compatibility.

EMI
Abbreviation for electromagnetic interference.

EMM
Abbreviation for expanded memory manager. A utility that uses extended memory to emulate expanded memory on computers with an Intel386™ or higher microprocessor.

EMS
Abbreviation for Expanded Memory Specification.

EPROM
Acronym for erasable programmable read-only memory.

ESD
Abbreviation for electrostatic discharge.

expanded memory
A technique for accessing RAM above 1 MB. To enable expanded memory on your computer, you must use an EMM. You should configure your system to support expanded memory only if you run application programs that can use (or require) expanded memory.

expansion bus
Your computer contains an expansion bus that allows the microprocessor to communicate with controllers for peripheral devices, such as a network card or an internal modem.

expansion-card connector
A connector on the computer's system board or riser board for plugging in an expansion card.

extended memory
RAM above 1 MB. Most software that can use it, such as the Windows operating system, requires that extended memory be under the control of an XMM.

external cache memory
A RAM cache using SRAM chips. Because SRAM chips operate at several times the speed of DRAM chips, the microprocessor can retrieve data and instructions faster from external cache memory than from RAM.

F
Abbreviation for Fahrenheit.

FAT
Acronym for file allocation table. The file system structure used by MS-DOS to organize and keep track of file storage. The Windows NT and OS/2® operating systems can optionally use a FAT file system structure.

FCC
Abbreviation for Federal Communications Commission.

flash memory
A type of EEPROM chip that can be reprogrammed from a utility on diskette while still installed in a computer; most EEPROM chips can only be rewritten with special programming equipment.

format
To prepare a hard-disk drive or diskette for storing files. An unconditional format deletes all data stored on the disk.

ft
Abbreviation for feet.

FTP
Abbreviation for file transfer protocol.

g
Abbreviation for gram(s).

G
Abbreviation for gravities.

GB
Abbreviation for gigabyte(s). A gigabyte equals 1,024 megabytes or 1,073,741,824 bytes.

graphics coprocessor
See **coprocessor**.

graphics mode
A video mode that can be defined as x horizontal by y vertical pixels by z colors.

group
As it relates to DMI, a group is a data structure that defines common information, or attributes, about a manageable component.

GUI
Acronym for graphical user interface.

h
Abbreviation for hexadecimal. A base-16 numbering system, often used in programming to identify addresses in the computer's RAM and I/O memory addresses for devices. The sequence of decimal numbers from 0 through 16, for example, is expressed in hexadecimal notation as: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, 10. In text, hexadecimal numbers are often followed by h.

heat sink
A metal plate with metal pegs or ribs that help dissipate heat. Most microprocessors include a heat sink.

HMA
Abbreviation for high memory area. The first 64 KB of extended memory above 1 MB. A memory manager that conforms to the XMS can make the HMA a direct extension of conventional memory. See also **upper memory area** and **XMM**.

host adapter
A host adapter implements communication between the computer's bus and the controller for a peripheral device. (Hard-disk drive controller subsystems include integrated host adapter circuitry.)

HPFS
Abbreviation for the High Performance File System option in the OS/2 and Windows NT operating systems.

Hz
Abbreviation for hertz.

ICES
Abbreviation for Interface-Causing Equipment Standard (in Canada).

ICU
Abbreviation for ISA Configuration Utility.

I/O
Abbreviation for input/output. The keyboard is an input device, and a printer is an output device. In general, I/O activity can be differentiated from computational activity. For example, when a program sends a document to the printer, it is engaging in output activity; when the program sorts a list of terms, it is engaging in computational activity.

ID
Abbreviation for identification.

interlacing
A technique for increasing video resolution by only updating alternate horizontal lines on the screen. Because interlacing can result in noticeable screen flicker, most users prefer noninterlaced video adapter resolutions.

internal microprocessor cache
An instruction and data cache built in to the microprocessor. The Intel Pentium microprocessor includes a 16-KB internal cache, which is set up as an 8-KB read-only instruction cache and an 8-KB read/write data cache.

IPX
Acronym for Internetwork Packet eXchange.

IPX/SPX
Acronym for Internetwork Packet eXchange/Sequenced Packet eXchange

IRQ
Abbreviation for interrupt request. A signal that data is about to be sent to or received by a peripheral device travels by an IRQ line to the microprocessor. Each peripheral connection must be assigned an IRQ number. For example, the first serial port in your computer (COM1) is assigned to IRQ4 by default. Two devices can share the same IRQ assignment, but you cannot operate both devices simultaneously.

ISA
Acronym for Industry-Standard Architecture. A 16-bit expansion bus design. The expansion-card connectors in an ISA computer are also compatible with 8-bit ISA expansion cards.

ITE
Abbreviation for information technology equipment.

jumper
Jumpers are small blocks on a circuit board with two or more pins emerging from them. Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit. Jumpers provide a simple and reversible method of changing the circuitry in a printed circuit board.

K
Abbreviation for kilo-, indicating 1,000.

KB
Abbreviation for kilobyte(s), 1,024 bytes.

KB/sec
Abbreviation for kilobyte(s) per second.

Kbit(s)
Abbreviation for kilobit(s), 1,024 bits.

Kbit(s)/sec
Abbreviation for kilobit(s) per second.

key combination
A command requiring you to press multiple keys at the same time. For example, you can reboot your computer by pressing the <Ctrl><Alt><Del> key combination.

kg
Abbreviation for kilogram(s), 1,000 grams.

kHz
Abbreviation for kilohertz, 1,000 hertz.

LAN
Acronym for local area network. A LAN system is usually confined to the same building or a few nearby buildings, with all equipment linked by wiring dedicated specifically to the LAN.

lb
Abbreviation for pound(s).

LED
Abbreviation for light-emitting diode. An electronic device that lights up when a current is passed through it.

local bus
On a computer with local-bus expansion capability, certain peripheral devices (such as the video adapter circuitry) can be designed to run much faster than they would with a traditional expansion bus. Some local-bus designs allow peripherals to run at the same speed and with the same width data path as the computer's microprocessor.

LPTn
The device names for the first through third parallel printer ports on your computer are LPT1, LPT2, and LPT3.

m
Abbreviation for meter(s).

mA
Abbreviation for milliampere(s).

mAh
Abbreviation for milliampere-hour(s).

math coprocessor
See **coprocessor**.

Mb
Abbreviation for megabit.

MB
Abbreviation for megabyte(s). The term *megabyte* means 1,048,576 bytes; however, when referring to hard-disk drive storage, the term is often rounded to mean 1,000,000 bytes.

MB/sec
Abbreviation for megabytes per second.

Mbps
Abbreviation for megabits per second.

MBR
Abbreviation for master boot record.

memory
A computer can contain several different forms of memory, such as RAM, ROM, and video memory. Frequently, the word *memory* is used as a synonym for RAM; for example, an unqualified statement such as "a computer with 16 MB of memory" refers to a computer with 16 MB of RAM.

memory address
A specific location, usually expressed as a hexadecimal number, in the computer's RAM.

memory manager
A utility that controls the implementation of memory in addition to conventional memory, such as extended or expanded memory.

memory module
A small circuit board containing DRAM chips that connects to the system board.

MHz
Abbreviation for megahertz.

microprocessor
The primary computational chip inside the computer that controls the interpretation and execution of arithmetic and logic functions. Software written for one microprocessor must usually be revised to run on another microprocessor. *CPU* is a synonym for microprocessor.

MIDI
Abbreviation for musical instrument digital interface.

MIF
Acronym for management information format. A MIF file contains information, status, and links to component instrumentation. MIF files are installed into the MIF database by the DMI service layer. The content of a MIF is defined by a DTMF working committee and is published in the form of a MIF definition document. This document identifies the groups and attributes that are relevant to DMI-manageable components.

mm
Abbreviation for millimeter(s).

modem
A device that allows your computer to communicate with other computers over telephone lines.

mouse
A pointing device that controls the movement of the cursor on a screen. Mouse-aware software allows you to activate commands by clicking a mouse button while pointing at objects displayed on the screen.

MPEG
Acronym for Motion Picture Experts Group. MPEG is a digital video file format.

ms
Abbreviation for millisecond(s).

MS-DOS
Abbreviation for Microsoft Disk Operating System.

MTBF
Abbreviation for mean time between failures.

multifrequency monitor
A monitor that supports several video standards. A multifrequency monitor can adjust to the frequency range of the signal from a variety of video adapters.

mV
Abbreviation for millivolt(s).

NDIS
Abbreviation for Network Driver Interface Specification.

NIC
Acronym for network interface controller.

NLM
Abbreviation for NetWare® Loadable Module.

NMI
Abbreviation for nonmaskable interrupt. A device sends an NMI to signal the microprocessor about hardware errors, such as a parity error.

noninterlaced
A technique for decreasing screen flicker by sequentially refreshing each horizontal line on the screen.

ns
Abbreviation for nanosecond(s), one billionth of a second.

NTFS
Abbreviation for the NT File System option in the Windows NT operating system.

NVRAM
Abbreviation for nonvolatile random-access memory. Memory that does not lose its contents when you turn off your computer. NVRAM is used for maintaining the date, time, and system configuration information.

online access service
A service that typically provides access to the Internet, e-mail, bulletin boards, chat rooms, and file libraries. CompuServe® is an example of an online access service.

OS/2
Abbreviation for Operating System/2.

OTP
Abbreviation for one-time programmable.

parallel port
An I/O port used most often to connect a parallel printer to your computer. You can usually identify a parallel port on your computer by its 25-hole connector.

parameter
A value or option that you specify to a program. A parameter is sometimes called a *switch* or an *argument*.

partition
You can divide a hard-disk drive into multiple physical sections called *partitions* with the **fdisk** command. Each partition can contain multiple logical drives.

After partitioning the hard-disk drive, you must format each logical drive with the **format** command.

PCI
Abbreviation for Peripheral Component Interconnect. A standard for local-bus implementation developed by Intel Corporation.

peripheral device
An internal or external device—such as a printer, a disk drive, or a keyboard—connected to a computer.

PGA
Abbreviation for pin grid array, a type of microprocessor socket that allows you to remove the microprocessor chip.

pixel
A single point on a video display. Pixels are arranged in rows and columns to create an image. A video resolution, such as 640 x 480, is expressed as the number of pixels across by the number of pixels up and down.

Plug and Play
An industry-standard specification that makes it easier to add hardware devices to personal computers. Plug and Play provides automatic installation and configuration, compatibility with existing hardware, and dynamic support of mobile computing environments.

POST

Acronym for power-on self-test. Before the operating system loads when you turn on your computer, the POST tests various system components such as RAM, the disk drives, and the keyboard.

ppm

Abbreviation for pages per minute.

PQFP

Abbreviation for plastic quad flat pack, a type of microprocessor socket in which the microprocessor chip is permanently mounted.

Program Diskette Maker

The Program Diskette Maker allows you to create program diskette sets, or master copies, of software that Dell installed on your computer system. It is essential that you create these diskette sets as soon as possible. You may need a set of master diskettes if you ever experience problems with your hard-disk drive and need to re-install your Dell-installed software. If your system includes Dell-installed software, you can select this program from the Dell Accessories program folder.

program diskette set

The set of diskettes from which you can perform a complete installation of an operating system or application program. When you reconfigure a program, you often need its program diskette set.

protected mode

An operating mode supported by 80286 or higher microprocessors, protected mode allows operating systems to implement:

- A memory address space of 16 MB (80286 microprocessor) to 4 GB (Intel386 or higher microprocessor)

- Multitasking

- Virtual memory, a method for increasing addressable memory by using the hard-disk drive

The Windows NT, OS/2, and UNIX® 32-bit operating systems run in protected mode. MS-DOS cannot run in protected mode; however, some programs that you can start from MS-DOS, such as the Windows operating system, are able to put the computer into protected mode.

PS/2

Abbreviation for Personal System/2.

RAID

Acronym for redundant array of inexpensive disks.

RAM

Acronym for random-access memory. The computer's primary temporary storage area for program instructions and data. Each location in RAM is identified by a number called a *memory address*. Any information stored in RAM is lost when you turn off your computer.

RAMDAC

Acronym for random-access memory digital-to-analog converter.

read-only file

A read-only file is one that you are prohibited from editing or deleting. A file can have read-only status if:

- Its read-only attribute is enabled.

- It resides on a physically write-protected diskette or on a diskette in a write-protected drive.

- It is located on a network in a directory to which the system administrator has assigned read-only rights to you.

readme file

A text file included with a software package or hardware product that contains information supplementing or updating the documentation for the software or hardware. Typically, readme files provide installation information, describe new product enhancements or corrections that have not yet been documented, and list known problems or other things you need to be aware of as you use the software or hardware.

real mode

An operating mode supported by 80286 or higher microprocessors, real mode imitates the architecture of an 8086 microprocessor.

refresh rate

The rate at which the monitor redraws the video image on the monitor screen. More precisely, the refresh rate is the frequency, measured in Hz, at which the screen's horizontal lines are recharged (sometimes also referred to as its *vertical frequency*). The higher the refresh rate, the less video flicker can be seen by the human eye. The higher refresh rates are also noninterlaced.

RFI

Abbreviation for radio frequency interference.

RGB

Abbreviation for red/green/blue.

ROM

Acronym for read-only memory. Your computer contains some programs essential to its operation in ROM code. Unlike RAM, a ROM chip retains its contents even after you turn off your computer. Examples of code in ROM include the program that initiates your computer's boot routine and the POST.

rpm

Abbreviation for revolutions per minute.

RTC

Abbreviation for real-time clock. Battery-powered clock circuitry inside the computer that keeps the date and time after you turn off the computer.

SDRAM

Abbreviation for synchronous dynamic random-access memory. SDRAM is a memory technology that improves the performance of your system's memory subsystem by reducing the need for wait states. SDRAM devices have a synchronous interface to the devices to which they are connected and are governed by the system clock. These features reduce the need for wait states often required for conventional memory devices to ensure that timing signals have been set up correctly.

In equivalent configurations, a computer with SDRAM will have faster memory performance than a computer with EDO memory.

sec

Abbreviation for second(s).

SEC

Abbreviation for single-edge contact. Newer Intel processors, such as the Pentium II processor, use this type of connector as an interface between the processor and the system board.

serial port

An I/O port used most often to connect a modem to your computer. You can usually identify a serial port on your computer by its 9-pin connector.

service tag number

A bar code label on the computer that identifies it when you call Dell for customer or technical support.

shadowing

A computer's system and video BIOS code is usually stored on ROM chips. Shadowing refers to the performance-enhancement technique that copies BIOS code to faster RAM chips in the upper memory area (above 640 KB) during the boot routine.

SIMD

Abbreviation for Single Instruction Multiple Data.

SIMM

Acronym for single in-line memory module. A small circuit board containing DRAM chips that connects to the system board.

SMART

Acronym for Self-Monitoring Analysis and Reporting Technology. A technology that allows hard-disk drives to report errors and failures to the system BIOS, which then displays an error message on the

screen. To take advantage of this technology, you must have a SMART-compliant hard-disk drive and the proper support in the system BIOS.

SNMP
Abbreviation for Simple Network Management Protocol. SNMP is an industry-standard interface that allows a network manager to remotely monitor and manage workstations.

SRAM
Abbreviation for static random-access memory. Because SRAM chips do not require continual refreshing, they are substantially faster than DRAM chips.

SRS
Abbreviation for sound retrieval system.

SVGA
Abbreviation for super video graphics array. VGA and SVGA are video standards for video adapters with greater resolution and color display capabilities than previous standards.

To display a program at a specific resolution, you must install the appropriate video drivers and your monitor must support the resolution. Similarly, the number of colors that a program can display depends on the capabilities of the monitor, the video driver, and the amount of video memory installed in the computer.

switch
On a computer system board, switches control various circuits or functions in your computer system. These switches are known as *DIP switches;* they are normally packaged in groups of two or more switches in a plastic case. Two common DIP switches are used on system boards: *slide* switches and *rocker* switches. The names of the switches are based on how the settings (on and off) of the switches are changed.

syntax
The rules that dictate how you must type a command or instruction so that the computer understands it.

system board
As the main circuit board, the system board usually contains most of your computer's integral components, such as the following:

- Microprocessor

- RAM

- Controllers for standard peripheral devices, such as the keyboard

- Various ROM chips

Frequently used synonyms for system board are *motherboard* and *logic board*.

system configuration information
Data stored in memory that tells a computer what hardware is installed and how the computer should be configured for operation.

system diskette
System diskette is a synonym for *bootable diskette*.

system memory
System memory is a synonym for *RAM*.

System Setup program
A BIOS-based program that allows you to configure your computer's hardware and customize the computer's operation by setting such features as password protection and energy management. Some options in the System Setup program require that you reboot the computer (or the computer may reboot automatically) in order to make a hardware configuration change. Because the System Setup program is stored in NVRAM, any settings remain in effect until you change them again.

system.ini *file*
A start-up file for the Windows operating system. When you start Windows, it consults the **system.ini** file to determine a variety of options for the Windows operating environment. Among other things, the **system.ini** file records which video,

mouse, and keyboard drivers are installed for Windows.

Running the Control Panel or Windows Setup program may change options in the **system.ini** file. On other occasions, you may need to change or add options to the **system.ini** file manually with a text editor, such as Notepad.

termination
Some devices must be terminated to prevent reflections and spurious signals in the cable. When such devices are connected in a series, you may need to enable or disable the termination on these devices by changing jumper or switch settings on the devices or by changing settings in the configuration software for the devices.

text editor
An application program for editing text files consisting exclusively of ASCII characters. Windows Notepad is a text editor, for example. Most word processors use proprietary file formats containing binary characters, although some can read and write text files.

text mode
A video mode that can be defined as x columns by y rows of characters.

time-out
A specified period of system inactivity that must occur before an energy conservation feature is activated.

tpi
Abbreviation for tracks per inch.

TSR
Abbreviation for terminate-and-stay-resident. A TSR program runs "in the background." Most TSR programs implement a predefined key combination (sometimes referred to as a *hot key*) that allows you to activate the TSR program's interface while running another program. When you finish using the TSR program, you can return to the other application

program and leave the TSR program resident in memory for later use.

TSR programs can sometimes cause memory conflicts. When troubleshooting, rule out the possibility of such a conflict by rebooting your computer without starting any TSR programs.

UL
Abbreviation for Underwriters Laboratories.

UMB
Abbreviation for upper memory blocks.

upper memory area
The 384 KB of RAM located between 640 KB and 1 MB. If the computer has an Intel386 or higher microprocessor, a utility called a *memory manager* can create UMBs in the upper memory area, in which you can load device drivers and memory-resident programs.

UPS
Abbreviation for uninterruptible power supply. A battery-powered unit that automatically supplies power to your computer in the event of an electrical failure.

USB
Abbreviation for Universal Serial Bus. A USB connector provides a single connection point for multiple USB-compliant devices, such as mice, keyboards, printers, and computer speakers. USB devices can also be connected and disconnected while the system is running.

utility
A program used to manage system resources—memory, disk drives, or printers, for example.

UTP
Abbreviation for unshielded twisted pair.

V
Abbreviation for volt(s).

VAC
Abbreviation for volt(s) alternating current.

VCCI
Abbreviation for Voluntary Control Council for Interference.

VCR
Abbreviation for video cassette recorder.

VDC
Abbreviation for volt(s) direct current.

VESA
Acronym for Video Electronics Standards Association.

VGA
Abbreviation for video graphics array. VGA and SVGA are video standards for video adapters with greater resolution and color display capabilities than previous standards.

To display a program at a specific resolution, you must install the appropriate video drivers and your monitor must support the resolution. Similarly, the number of colors that a program can display depends on the capabilities of the monitor, the video driver, and the amount of video memory installed for the video adapter.

VGA feature connector
On some systems with a built-in VGA video adapter, a VGA feature connector allows you to add an enhancement adapter, such as a video accelerator, to your computer. A VGA feature connector can also be called a *VGA pass-through connector*.

video adapter
The logical circuitry that provides—in combination with the monitor—your computer's video capabilities. A video adapter may support more or fewer features than a specific monitor offers. Typically, a video adapter comes with video drivers for displaying popular application programs and operating systems in a variety of video modes.

On some Dell computers, a video adapter is integrated into the system board. Also available are many video adapter cards that plug into an expansion-card connector.

Video adapters often include memory separate from RAM on the system board. The amount of video memory, along with the adapter's video drivers, may affect the number of colors that can be simultaneously displayed. Video adapters can also include their own coprocessor for faster graphics rendering.

video driver
A program that allows graphics-mode application programs and operating systems to display at a chosen resolution with the desired number of colors. A software package may include some "generic" video drivers. Any additional video drivers may need to match the video adapter installed in the computer.

video memory
Most VGA and SVGA video adapters include memory chips in addition to your computer's RAM. The amount of video memory installed primarily influences the number of colors that a program can display (with the appropriate video drivers and monitor capabilities).

video mode
Video adapters normally support multiple text and graphics display modes. Character-based software displays in text modes that can be defined as x columns by y rows of characters. Graphics-based software displays in graphics modes that can be defined as x horizontal by y vertical pixels by z colors.

video resolution
Video resolution—800 x 600, for example—is expressed as the number of pixels across by the number of pixels up and down. To display a program at a specific graphics resolution, you must install the appropriate video drivers and your monitor must support the resolution.

virtual memory

A method for increasing addressable RAM by using the hard-disk drive. For example, in a computer with 16 MB of RAM and 16 MB of virtual memory set up on the hard-disk drive, the operating system would manage the system as though it had 32 MB of physical RAM.

virus

A self-starting program designed to inconvenience you. Virus programs have been known to corrupt the files stored on a hard-disk drive or to replicate themselves until a computer or network runs out of memory.

The most common way that virus programs move from one computer to another is via "infected" diskettes, from which they copy themselves to the hard-disk drive. To guard against virus programs, you should do the following:

- Periodically run a virus-checking utility on your computer's hard-disk drive

- Always run a virus-checking utility on any diskettes (including commercially sold software) before using them

VLSI

Abbreviation for very-large-scale integration.

Vpp

Abbreviation for peak-point voltage.

VRAM

Abbreviation for video random-access memory. Some video adapters use VRAM chips (or a combination of VRAM and DRAM) to improve video performance. VRAM is dual-ported, allowing the video adapter to update the screen and receive new image data at the same time.

W

Abbreviation for watt(s).

WH

Abbreviation for watt-hour(s).

win.ini file

A start-up file for the Windows operating system. When you start Windows, it consults the **win.ini** file to determine a variety of options for the Windows operating environment. Among other things, the **win.ini** file records what printer(s) and fonts are installed for Windows. The **win.ini** file also usually includes sections that contain optional settings for Windows application programs that are installed on the hard-disk drive.

Running the Control Panel or Windows Setup program may change options in the **win.ini** file. On other occasions, you may need to change or add options to the **win.ini** file manually with a text editor such as Notepad.

Windows 95

An integrated and complete Microsoft Windows operating system that does not require MS-DOS and that provides advanced operating system performance, improved ease of use, enhanced workgroup functionality, and simplified file management and browsing.

Windows NT

High-performance server and workstation operating system software developed by Microsoft that is intended for technical, engineering, and financial applications.

write-protected

Read-only files are said to be *write-protected*. You can write-protect a 3.5-inch diskette by sliding its write-protect tab to the open position or by setting the write-protect feature in the System Setup program.

XMM

Abbreviation for extended memory manager, a utility that allows application programs and operating systems to use extended memory in accordance with the XMS.

XMS

Abbreviation for eXtended Memory Specification.

ZIF

Acronym for zero insertion force. Some computers use ZIF sockets and connectors to allow devices such as the microprocessor chip to be installed or removed with no stress applied to the device.

Index

D

J

jacks
    line-in jack, 6-1, B-14
    line-out jack, 6-1, B-14
    location on back panel, B-6
    microphone jack, 6-1, B-13

jumpers
    about, 7-6, B-1
    BIOS jumper, B-4
    location, B-3
    PSWD jumper, 3-24, B-4
    settings (table), B-4
    speed jumpers, 8-12, B-4

K

key combinations
    <Ctrl><Alt><Del>, A-4
    <Ctrl><Alt><Enter>, A-4
    ISA Configuration Utility, 4-5
    System Setup program, 3-4

keyboard
    cleaning, D-3
    reporting errors during POST, 3-10

keyboard connector
    about, B-10
    location, 8-2
    pin assignments, B-11
    pin numbers, B-11

Keyboard Errors option, 3-10

keys
    ISA Configuration Utility, 4-5
    System Setup program, 3-1, 3-4, 3-25

L

line-in jack, 6-1, B-14

line-out jack, 6-1

logical formatting, 9-14

LPT port designations, B-7

M

memory
    about, 1-2, B-16
    adding, 8-7
    address maps, B-16, B-17
    error messages after installing, 3-25
    reserved memory, 3-9

messages
    Configuration Manager, C-7
    help messages on System Setup
        screens, 3-3
    invalid configuration information, 3-1,
        8-8
    ISA Configuration Utility, C-1
    prompt to enter the System Setup
        program, 3-1
    responding to error messages, 3-25

microphone jack, 6-1, B-13

microphones
    connecting, 6-2

microprocessor
    fan connector, 8-2
    installing and removing, 8-10
    jumper settings for speed, 8-12, B-4
    SEC cartridge connectors, 8-2
    SEC cartridge/heat sink assembly
        removal, 8-11
    speeds, 1-1, 3-9

Microsoft updated ATAPI driver, 2-9

Microsoft updated ATAPI drivers, 2-8

monitor
    cleaning, D-3

mouse connector
    about, B-10, B-11
    location, 8-2, B-6
    pin assignments, B-11
    pin numbers, B-11

Mouse option, 3-16

drives, 9-1
expansion cards, 8-4
microprocessor, 8-10

upper memory address map, B-17

UPS, D-9

USB connectors
about, B-12
location, 8-2
pin assignments, B-13
pin numbers, B-13

V

VESA and power management, 3-14

VGA DAC Snoop option, 3-10

video connector, 7-6, B-12

Video Electronics Standards Association.
    See VESA

video problems, 3-10

volume
adjusting, 6-3

W

Wakeup On LAN
about, 1-2
connector, 8-2
option, 3-16

warm boot, 3-12

warnings, xiii, 7-1

warranty information, xii, F-1

Windows 95
audio drivers, 6-5, 6-6
bus-mastering EIDE driver, 2-8
NIC driver, 5-5

Windows 98
NIC driver, 5-9

Windows NT 4.0
audio drivers, 6-7

NIC driver, 5-4

Z

Zip drives
backing up data, D-1
cleaning, D-4